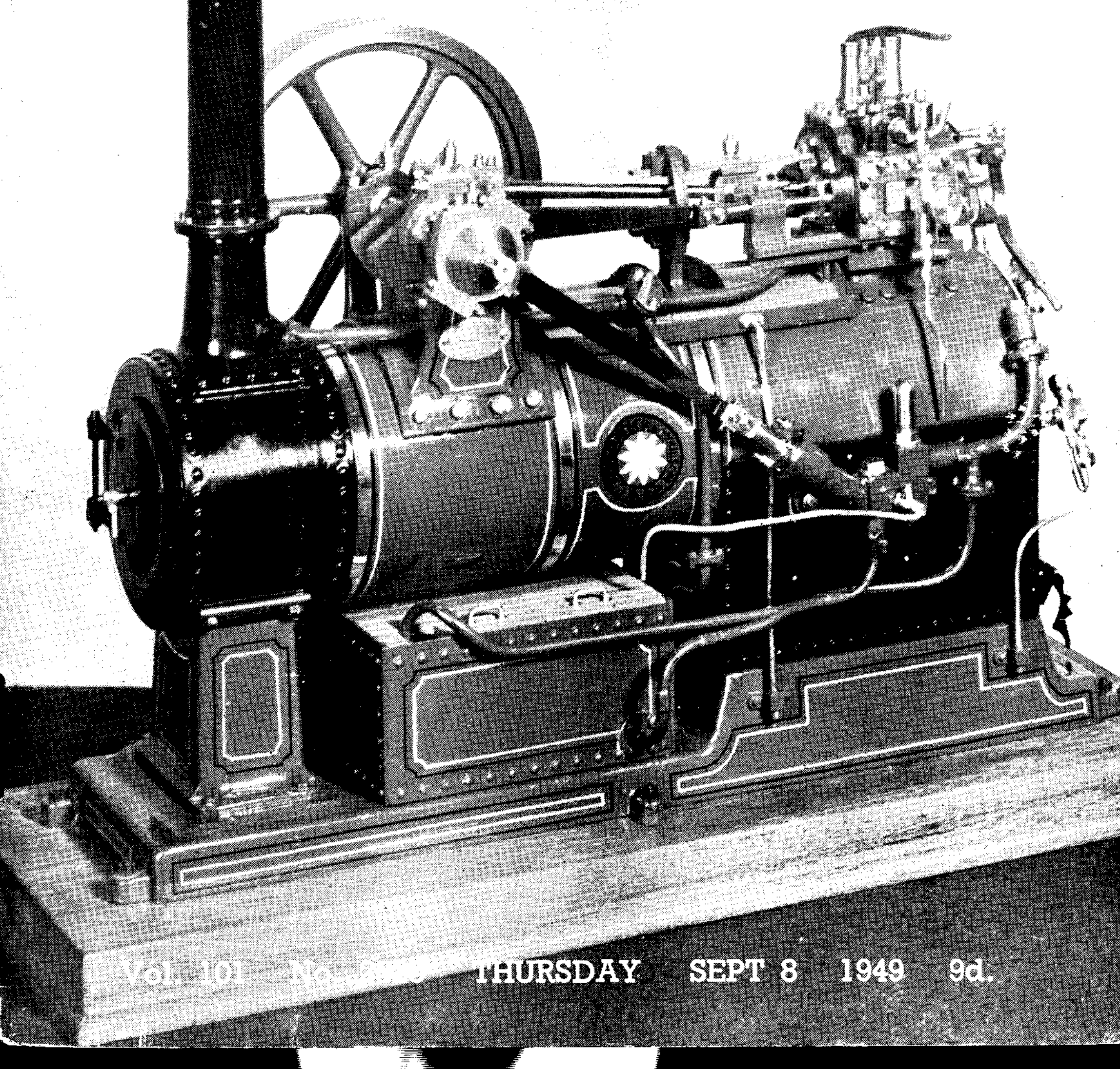
THE MODEL ENGINEER



Vol. 101 No. [illegible] THURSDAY SEPT 8 1949 9d.

The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

8TH SEPTEMBER 1949 VOL. 101 NO. 2520

SMOKE RINGS

Our Cover Picture

● WE PORTRAY this week the exceptionally fine overtype steam engine constructed by Messrs. Kent, Tapper and Moulson, of Birmingham, an exhibit in the competition section of this year's MODEL ENGINEER Exhibition. Most creditable, perhaps, is the fact that all machined parts were produced on machines designed and constructed by the makers. Correctness to detail is the main feature of all models made by this enthusiastic trio, and all who have witnessed their work will undoubtedly recall the high degree of finish and detail which have in the past typified their aptitude and craftsmanship.

The Pied Piper

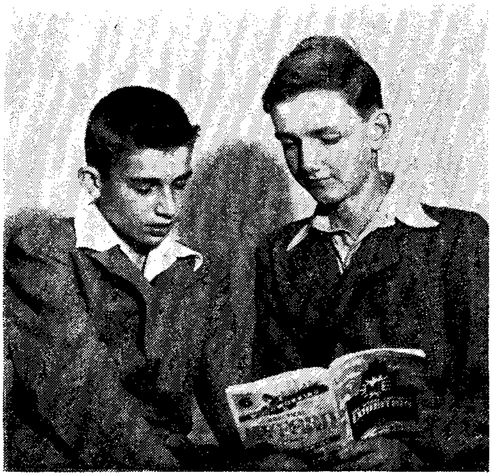
● THIS ANCIENT legend was re-enacted in a modern form on the opening day of the Exhibition when the model traction engine driven by Mr. Hammett, of Danson Park, got under way in the street outside the Horticultural Hall. No sooner was the model in motion than a retinue, mostly but not exclusively consisting of juvenile enthusiasts, fell into line immediately behind it, and took part in the parade around the Horticultural Hall. The interest taken by the general community in any unusual spectacle, from a hole in the road to a free fight, is traditional but there is good reason to believe that this is accentuated by anything of a mechanical interest. There is an engine driver latent in every one of us, and one may conclude that the youngster who has no cravings whatever to become an engine driver is definitely not quite normal.

Not What They Seem

● ON THE stand of the Model Railway Club at the "M.E." Exhibition, there was a nice display of small-scale colour-light railway signals which could be lit up upon the pressing of a button. A small boy duly discovered the button and pressed it, and, when the little signals lit up, exclaimed: "Coo, look! Traffic lights!" Evidently, his education had not advanced very far!

Entente Cordiale in the Queue

● ALTHOUGH THE queue which patiently waited for some hours for THE MODEL ENGINEER Exhibition to open was predominantly adult, the first to take up position were boys. Peter Bunker, of Cheam, and Bernard Mavic, of Toulon, were at the head of a two-hundred-yard crocodile around twelve noon on Opening Day. Peter is



a model railway enthusiast with a special preference for "O" gauge. He is a member of the Charterhouse Model Railway Club and has his own layout. He went home much, much later in the day, very tired out but with lots of new ideas and a keener edge on his enthusiasm. His little French friend, Bernard Mavic, was not a model railway fan before he left home but was well on the way to becoming one before he left the show. He came over for a fortnight's holiday to see the sights of London and Peter insisted that the exhibition was one of the sights which must not be missed. Our photograph shows Bernard on the left and Peter on the right having a look through the catalogue.

Exhibition at Wembley

● THE HARROW and Wembley Society of Model Engineers will be holding its annual exhibition at the Wesley Hall, High Road, Wembley, Middx., on September 22nd, 23rd and 24th. As usual, there will be six sections, or groups, covering: Locomotives, Marine engines, Aircraft, I.C. engines, Handicrafts and General Engineering models including Horological, Scientific and Optical apparatus. Generous prizes will be given in each group, and the competition is open to all model engineers. Entry forms can be obtained from the Exhibition Secretary, Mr. C. R. Fox, 71, Norval Road, North Wembley, and should be completed and returned not later than Monday, September 19th.

A Derby Project

● MR. W. K. WALLER, joint hon. secretary of the Derby Society of Model and Experimental Engineers, informs us of an important project which the society has agreed to undertake at the invitation of the County Borough of Derby Museum and Art Gallery Committee. An Industrial Section in the Derby Museum is being developed by the committee, and the society has undertaken to design and build a model of a representative section of the old Midland Railway, and to equip it with scale working models of locomotives and rolling-stock of the line, covering the period from the time of its beginning to the time of the grouping of the "big four."

Mr. Waller, on behalf of the society, would be pleased to hear from any model railway *builders* who would care to become associated with this scheme; his address is: 37, Douglas Street, Derby. We would add that the models will be built to the "Fine Scale" 7-mm. to the foot.

We feel that this is a scheme which may well set an example to other museum authorities, particularly to those in areas associated with the construction of locomotives, rolling-stock and railway equipment. It is a matter for profound regret that here, in England, the country which gave the railways to the world, there is no national Railway Museum, and no prospect, apparently, of there ever being one. Yet, with every day that passes, railway history recedes more and more into the past; therefore, any scheme official or otherwise, which can help to perpetuate it is to be welcomed.

But quick action is wanted, so that historical models can be built before the necessary information to ensure their accuracy is lost for ever. It seems to us that some such scheme is far more worth considering than many other matters on which time, money and discussion are expended today.

Another Stolen Model

● WE HAVE been informed by Mr. J. A. King, the hon. secretary of the Welling and District M.E.E. Society that, during the process of returning models loaned for the recent South-Eastern Association exhibition at Bromley, a steam boat belonging to Mr. A. C. Clark was stolen from a car during the journey from Bromley to Erith.

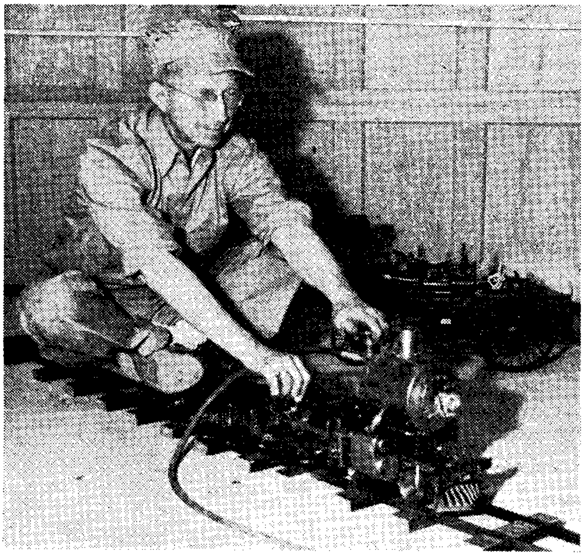
The boat, which was named *Salvage*, was described in the issue of THE MODEL ENGINEER dated November 25th, 1943. It has a steam plant having several distinctive features, including a boiler with a most ingenious method of automatic feed in which the weight of water in the boiler operates a balance device which controls the opening of the check-valve. A twin-cylinder engine is mounted to the stern of the boat and the exhaust is taken up the funnel, which is also towards the after end. The boat is painted black below the waterline and white above.

We have, on previous occasions, been able to assist readers to recover lost or stolen models by describing them in THE MODEL ENGINEER and we would again call attention to the fact that such models, although possibly capable of being disguised superficially, are generally readily identifiable by their individual features, which is certainly true in this particular case, and we trust that this will be the means of getting the boat returned to its rightful owner. Should any of our readers see a boat answering to the above description, we should be obliged if he would communicate with Mr. J. A. King at 150, Sutherland Avenue, Welling, Kent, and give as much information as possible.

Road Testing Without a Boiler

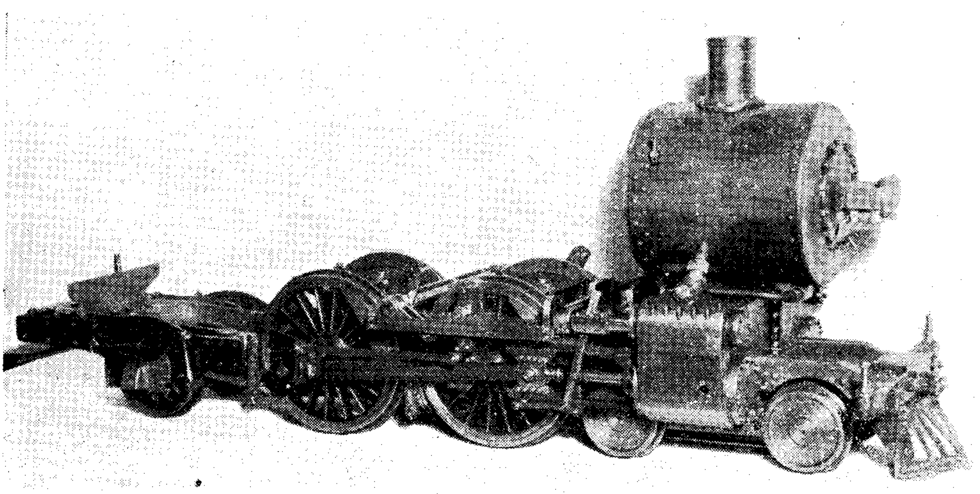
by "L.B.S.C."

THOSE good but misguided folk who are never tired of raising the "tractive - effort - adhesive - weight" bogey, may be interested in the accompanying pictures, which were kindly forwarded by Mr. C. Divoky, a follower of these notes who hails from Cleveland, Ohio, U.S.A. Our good friend mentioned, and his fellow-conspirator, Mr. Fred Wise, are both ardent locomotive builders; and they were so anxious to see what results they could expect from their craftsmanship, that when the chassis of each of their locomotives were completed sufficiently to run, they went a step further than my recommended bench test with a tyre pump. A temporary track was made up, using $\frac{3}{4}$-in. by $\frac{3}{16}$-in. strip steel, fitted into grooves milled at the correct spacing, in the sleepers. This was laid on the workshop floor, and the steam pipe on the engine connected to a small compressor by a flexible pipe and stop-valve. Both the embryo locomotives ran up and down, hauling the loads without any trouble, despite the fact that the load on the driving wheels was very light. One of the pictures shows friend Wise actually on the job—and who says there is nothing in a name?



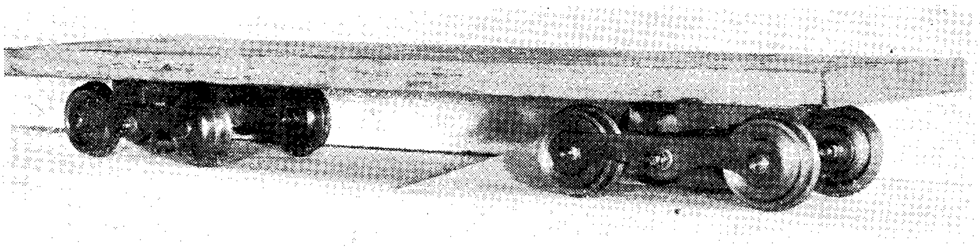
Literally "riding on air!"

The locomotive herself is a very nice job, as may be seen by the separate photograph. Mr. Divoky's own engine isn't so far advanced; it is a Pacific type locomotive, but at time of writing, only the driving wheels and the "works" are completed.

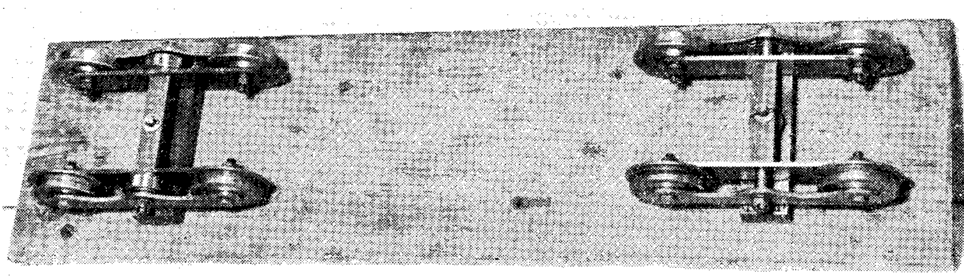


Mr. F. Wise's American "Atlantic" growing up

Despite that, she hauled her owner and builder, when connected to the same rig-up as shown. When space permits, I hope to show a photo of that engine, too, as she has several interesting points, one being the disc-centre wheels. The car used on the tests was a similar one to that built by Mr. Manning and described in these notes; but was independently conceived—"great minds still think alike!" However, the one shown has an improvement. When a car with the usual type of bogie comes off the straight on to a curve, there is a tremendous amount of side pressure on the flanges of the leading wheels, owing to the friction between bolster plate and bogie centre, when the car is carrying a heavy load. To get over this, our Cleveland friends arranged one of their car bogies to carry the weight *via* a couple of roller-bearings. The arrangement is clearly shown in the reproduced photo, and needs no description. The other bogie bears at the centre only, giving three-point suspension, and the bush through which the bogie pin works is belled out top and bottom, so that the whole bag of tricks is enabled to tilt sideways as needed when running on an uneven road. A similar arrangement would be a boon and blessing on some of the club tracks, where derailments are the order of the day.



"Three-point suspension" passenger car



Note ball-bearing bolster for easy swivelling

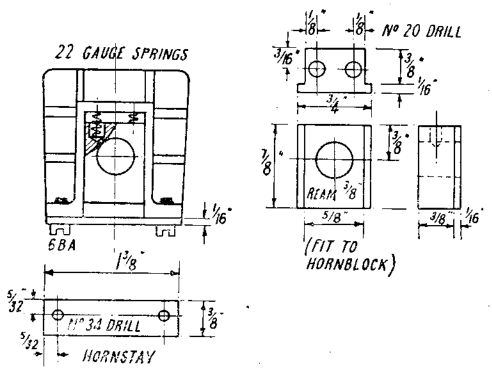
The castings for Mr. Wise's engine were supplied by Lester Friend's "Yankee Machine Shop," at Danvers, Mass. The traction engine shown in the background of the picture is also our Wise friend's handiwork, and a very nice example, too. Readers who are familiar with the now-nearly-extinct British traction engine will note the difference between it and the American type, which has the cylinders at the firebox end and is much more "spidery" in general construction.

Boiler Lagging

Some readers who have nearly completed locomotives described in these notes are concerned because I have not given full instructions for lagging the boilers, and want to know why. Well, as a matter of fact, there is no actual need for lagging on most little locomotive boilers such as I describe, as any small heat loss is more than cancelled out by the steaming capacity. Where lagging is desirable is in the case of a boiler such as that specified for "Hielan' Lassie," in which the boiler itself has a parallel barrel, described thus for ease of manufacture; and a tapered lagging is fitted to simulate the tapered boiler of the full-sized engine. One of my own locomotives, the $2\frac{1}{2}$-in. gauge L.N.E.R. Pacific, "Tishy," has a parallel boiler barrel and a tapered lagging to the rear part of the barrel and the firebox wrapper. The space between the cleading sheets themselves and the actual boiler is filled up with some thin felt. When working, the outside of the boiler doesn't become quite as hot as those engines with unlagged barrels, but as far as steaming qualities are concerned, there is nothing in it. Whatever gain in thermal efficiency there might be is entirely undiscernible.

My usual practice is merely to put a thin sheet of metal over the firebox wrapper to hide up the stayheads; and I leave the barrel "naked and unashamed," except for the boiler bands, just like a ballet-dancer whose working costume is a skirt and rings. Old "Ayesha" has done all her work

in that rig-out ever since she was first built—in fact, for some little time, she never even had the "skirt"—and it has never affected her steaming and pulling, though she has run in a rainstorm on more than one occasion. Raindrops falling on the hot boiler have turned into steam, so that she appeared to be making as much steam outside the boiler as inside. She has also worked outdoors in falling snow, with the temperature below



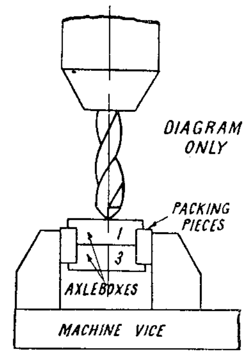
Hornblocks and axleboxes for "Tich"

freezing-point, and it hasn't apparently made the least difference; although, as Nature cannot be fooled, she has probably burned a little more coal than she would have done in a heat wave. "Jeanie Deans" has no lagging whatever; the lower part of the wrapper is very nearly covered by the fenders which form the lower part of the cab, and there are only three stayheads visible. "Grosvenor" has a thin copper sheet over the firebox wrapper covering the stayheads, and it is held down by the same pair of clips that hook over the expansion brackets at each side, to prevent the boiler lifting off the frames. A boiler-band covers the joint between this sheet and the barrel, which has the usual bands, spaced out as on the full-sized engine.

When the full-sized "Adas" were first built, they had no lagging; just merely a cleading sheet over the boiler, with an air-space between sheet and boiler. My 4-4-2 tank engine, "Olga," has a similar arrangement, as she is a drastic rebuild of an old commercial job which had a water-tube boiler fired by six 1-in. spirit burners. She mopped up the "liquid poison-gas" like a "spam-can" mops up coal. When I rebuilt her, I used the original water-tube boiler's outer casing and put a proper coal-fired locomotive-type boiler inside it, leaving about $\frac{3}{16}$ in. or so of air space between boiler and casing, except for about $\frac{3}{8}$ in. at the front end of the barrel. This was packed with asbestos string in order to get an airtight smokebox. When at work, this boiler becomes about as hot outside as "Tishy's."

If anybody likes to take the trouble, they can go ahead and provide full lagging to the boilers of the "Maid of Kent," "Minx" and "Doris." Asbestos sheeting is popularly supposed to be the best insulation, but it isn't, from the "thermal efficiency" point of view. Felt or flannel is ever so much better; if you have an old felt hat which has outlived its original purpose, here is a good use for it. The thickness would be just about right. The outer cleading sheets may be of very thin brass or copper, held on by boiler bands made from thin spring steel, or the flat brass strip known commercially as "ticket wire," same as I used for "Grosvenor" and "Jeanie Deans." Some folk prefer what is known as "planished" steel, which is just steel sheet with a very smooth surface; or another material of similar appearance known as "Russian iron." The trouble with these materials is that any condensation that might take place between the sheeting and the boiler soon eats the thin steel into holes. Same thing happens if a tiny whimper should develop around any of the stayheads.

Personally, I shouldn't bother about lagging the barrels of any of the three engines mentioned, but just follow my usual practice and cover the firebox wrapper with a sheet of thin brass or copper, say about 26-gauge. It can be held on by a few $\frac{1}{16}$-in. or 10-B.A. brass screws tapped into the wrapper itself. The weeny holes won't weaken the boiler shell, and a taste of plumber's jointing on the threads will prevent any Welsh vegetables developing. Should it be necessary to examine the stayheads at any future time, it is only a couple of minutes' work to remove the cleading sheet. Boiler bands can be fitted around the bare barrels to simulate those on the full-sized engines. Bend the ends of the bands at right-



How to drill second axlebox to match first

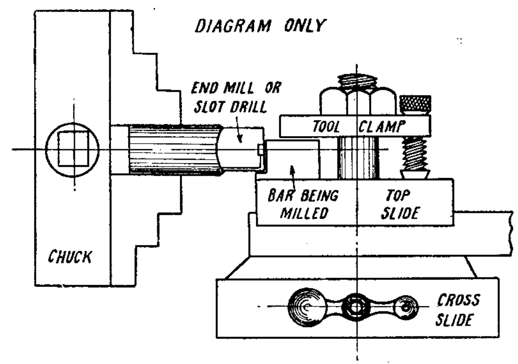
angles, after drilling or punching the screw-holes in them, and secure in place with $\frac{1}{16}$-in. or 10-B.A. screws and nuts.

Beginners' Corner—Axleboxes for "Tich"

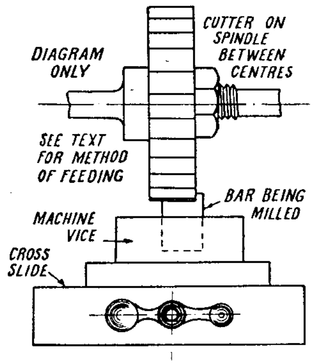
Before carrying on with more instructions, may I say a friendly word to some beginners who are inclined to be impatient. Now that two of the bigger engines are out of the way, I hope to include the "Beginners' Corner" a little more frequently, circumstances and the K.B.P. permitting; but I would like to remind our abovementioned friends that there are others beside themselves who look to these notes for instruction, and also a little amusement. It apparently has not occurred to them, that if I concentrated on

"Beginners' Corner," there would be a nice old hullabaloo among the other readers, many of whom already reckon that my ordinary instructions are simple enough for any beginner with enough average "gumption" to follow. Verily, it is some job to try to please everybody—'nuff sed!

The axleboxes for "Tich" may be made from castings, from bar material or built up from bar and sheet. In the case of castings, the four will be cast in a stick; a piece of bar the same length, approximately 4 in. long, $\frac{3}{4}$ in. wide and $\frac{7}{16}$ in. thick, will also do quite well. Our advertisers will see that the metal in the castings will be of the right quality. Bar material should be good hard bronze or gunmetal; not soft brass, or the alloy frequently sold as brass and known in the trade as "screw-rod." Either of these would rapidly wear. Good tough brass would be satisfactory. The first item is to mill the rebates, as they are called; that is, the part which slides in the hornblock jaws. It will be noticed that these axleboxes have a single flange only, which is for two reasons; one, it is easier for beginners than making axleboxes with flanges both sides. Two, it automatically allows the boxes to tilt a little in the frames when following the "'umps and 'ollers," as the p-way gang might say, of an uneven line, thus preventing running off the road.



How to mill axleboxes with home-made cutter



How to mill axleboxes with ordinary cutter

If a regular milling machine is available, all that is needed is to put an end-and-face cutter on the arbor, set the piece of bar horizontally in the machine-vice and traverse it under the cutter which will take out the rebate at one fell swoop; but milling machines are only just beginning to find their way into home workshops, so the lathe has to do the needful. There are two ways of doing the job on the lathe. The first is to copy the above proceeding, putting a cutter not less than $\frac{5}{8}$ in. wide and about 2 in. diameter on an arbor or spindle between lathe centres. The piece of bar is held in a machine-vice on the lathe saddle and traversed under the cutter by means of the cross-slide screw. Note—very important this—that the movement of the slide must be, *against* the cutter teeth, otherwise the cutter will catch up and probably wrench the arbor from between the centres, damaging the lathe in the process. Either run the lathe in the usual direction and feed by pulling the cross-slide toward you, or run the lathe backwards and feed in the cross-slide in the usual way, according to which way the cutter is mounted on the arbor.

The work must be set in the machine-vice at such a height that the cutter will take out the correct amount of metal. Here is where those who own an old 4-in. Drummond round-bed lathe will score, because the slotted table which forms the cross-slide may be raised and lowered, giving the facility of a regular milling-machine. A simple form of vertical saddle adjustment would add enormously to the usefulness of certain much-advertised small lathes on the market.

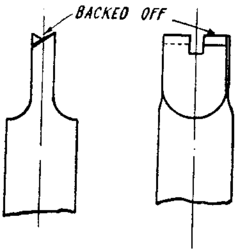
Simple Tool-making

Did I hear some beginner say he had no machine-vice and they were expensive? Well, don't let that worry you! It didn't worry young Curly, whose finances were nearly always at rock-bottom. Curly sawed two pieces of angle from the broken kitchen fender, and with a couple of long stove screws he had a nobby machine-vice in very little time. The illustration shows the simple rig-up. Any convenient and available bits of angle and screws may be used; to bolt it down to the lathe saddle or cross-slide, simply drill holes as required in the horizontal members.

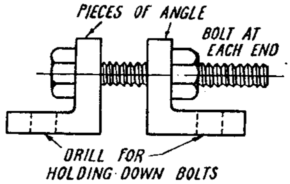
Somebody else has no milling cutters; they, too, are expensive. In that case, try another method. Make a slot drill, put it in your three-jaw chuck, mount the piece of bar on the slide-rest, clamp it down with the tool-holder clamp, and traverse it across the slot drill. To make the slot drill or slotting cutter you need about 2 in. of round cast steel $\frac{7}{16}$ in. diameter. File away each side of this until it looks like a glorified screw-driver; then file a nick across the middle and back off each side of the nick as shown in the illustration. Use a fine file for this job. Then harden and temper the cutter. Heat to medium red and plunge into clean cold water. Brighten up the business end of the cutter with fine emery-cloth, or similar abrasive, taking care not to destroy the cutting edges; then hold the shank end of the cutter in a blowlamp or gas

flame. Watch the colours travel down the bright part, and as soon as the dark yellow reaches the cutting edges, drop the cutter into the cold water again. Give the cutting edges a rub on an oilstone and the cutter is ready for use. Personally, I prefer these home-made cutters to any commercial end-mill, as I find they cut faster, cleaner and much more freely. I made lots of them in the old days before I had a milling-machine.

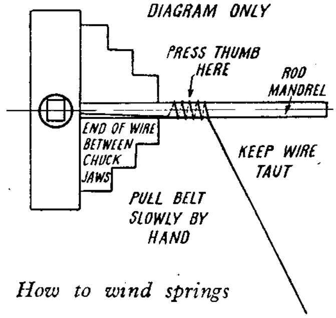
put your steel rule between the bar and faceplate; both sides of the rule being parallel, the effect is just the same as if bar and faceplate were in contact. When both sides of the bar are milled, either hold it in the four-jaw and part off four $\frac{7}{8}$-in. portions, or saw it up, chuck each piece separately and face off each end with a round-nose tool set crosswise in the rest, until each piece is exactly $\frac{7}{8}$ in. long.



Slotting cutter



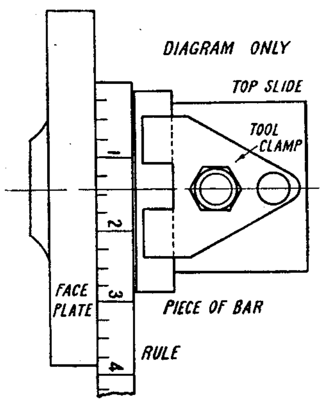
Improvised machine-vice



How to wind springs

Another Way of Machining Axleboxes

The accompanying illustration shows how to use the slot drill. Put it in the three-jaw chuck and put the piece of bar under the slide-rest tool-holder, packing up if necessary to allow the cutter to leave $\frac{1}{16}$ in. of the bar the full width. Then traverse the bar across the cutter by turning the cross-slide handle. Run the lathe at a good speed. An ordinary end-mill may, of course, be used instead of the home-made cutter. When one side is cut, reverse the piece of bar and cut the other side, but use a gauge to get the milled part the exact width. I use a spare hornblock, but an opening the exact width of the hornblock jaws, made in a piece of sheet metal, does just as well.

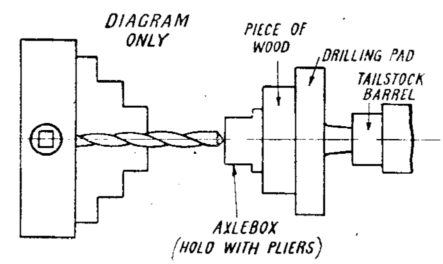


How to set axlebox blank truly for milling

To set the piece of bar truly for the operation is simplicity itself. Take off the chuck and put on the faceplate. Run the slide-rest up to the faceplate and press the bit of bar against it whilst you tighten the clamp screws. If it won't reach,

Built-up Axleboxes

Axleboxes can also be made without any milling. Get a piece of bar 4 in. long, $\frac{5}{8}$ in. wide and $\frac{3}{8}$ in. thick. Cut a strip of $\frac{1}{16}$-in. or 16-gauge sheet brass same length and approximately $\frac{7}{8}$ in. wide. Lay this in a tin lid, tray or pan of any kind available on top of a layer of small coke, breeze or cinders. Smear it over with a paste made from "Easyflo" flux and water or ordinary powdered borax and water, and put the piece of bar on top of it. Heat the whole lot to medium red with a blowlamp or blowpipe, then touch the joint with a strip of "Easyflo" or ordinary best-grade silver-solder. Only a very little is required; it will melt and flow into the joint. Let it cool to black, then drop it into a pickle made by adding one part of commercial sulphuric acid to about fifteen parts of water. Warning: don't on any account add the water to the acid; if you do, you'll either need to take quick advantage of the National Health Service [?] or have to buy some more clothes or overalls, or both. After a few minutes



How to drill axleboxes in the lathe

in the pickle, fish out the piece, wash well in running water, clean up with a scratch brush or fine emery-cloth and serve the bar as directed for the milled one. The side flanges can be filed to $\frac{1}{16}$ in. width.

How to Drill Truly for Axles

Fit the boxes to the hornblocks and mark one side 1 and 2 and the other side 3 and 4 on both horns and boxes, so you can always put them back correctly. Also mark which is the top. Now, on boxes 1 and 2, set out the position of the axle hole $\frac{3}{8}$ in. from the top and dead in the middle. Make a heavy centre-dot, then drill through the box with a $\frac{1}{8}$-in. or No. 30 drill. As the hole *must* go through squarely, use a drilling-machine; if you haven't one, use the lathe. Put the drill in the chuck, take out the tailstock centre and, if you have a drilling pad, put it in and hold the axlebox against it with a pair of pliers, putting a true piece of wood between. Feed up by turning the hand wheel. If you haven't any drilling pad, put the piece of wood against the end of the tailstock barrel.

As the axles must lie square across the frame use each box as a guide to drill its opposite mate. Take No. 1 and No. 3 boxes and place them face to face; then put a bit of strip metal, say $\frac{1}{8}$ in. thick, at each side in the channel formed by the two flanges. Grip the lot in the machine-vice, then drill the second box by putting the drill through the hole in the first one, using either drilling machine or lathe as described above. Then, even if the first box is very slightly "off-centre," the second one will be just the same, and the axle will still lie square across the frames. Serve No. 2 and No. 4 boxes in like manner and then open out all the holes with a 23/64-in. drill, using drilling-machine or lathe as before. Leave the reaming until the boxes are finally fitted to the frames.

Springs and Hornstays

Each axlebox has two springs housed in pockets drilled in the top of each box; these are located $\frac{1}{8}$ in. from each end, $\frac{3}{16}$ in. from the narrower side, and are $\frac{3}{16}$ in. deep. Drill these pockets with a No. 20 drill, then with a $\frac{1}{16}$-in. or No. 52 drill, drill an oil hole from the bottom of each pocket into the axle hole.

The hornstays are $1\frac{3}{8}$-in. lengths of $\frac{3}{8}$-in. by $\frac{1}{16}$-in. strip steel, or they may be cut from $\frac{1}{16}$-in. sheet. Each one has two screwholes drilled with No. 34 drill located 5/32 in. from each end and 5/32 in. from one side. Put each hornstay in place, holding the frames upside down, with the screwholes on the side of the hornblock away from the frames. Run the No. 34 drill in the holes and make countersink marks in the feet or lugs of the hornblock; remove the hornstay, drill the marked places with No. 44 drill and tap 6 B.A. Ordinary cheese-head screws may be used to attach the stays to the hornblocks, the bottoms of the lugs being filed flush with the frame.

To make the springs, put a piece of $\frac{1}{8}$-in. round steel rod in the three-jaw. Take a length of 22-gauge tinned steel wire (our advertisers sell it) and bend about an inch or so at right-angles. Poke this between the chuck jaws, then carefully pull the lathe belt with your left hand, guiding on the wire with your right until three or four equally-spaced coils are wound on the rod. Then, if you press your thumb on them and continue to pull the belt steadily, a nice even spring will form on the rod. Cut off eight pieces about $\frac{5}{16}$ in. long and touch the ends on your emery-wheel whilst it is running full speed—but mind your fingers! These springs are placed in the pockets and the axleboxes can then be erected as shown with the flanges outside the frames. See that each one is in its proper hornblock. Finally, poke a $\frac{3}{8}$-in. parallel reamer through each pair of boxes, using a tap-wrench to turn it, and whilst turning, work the boxes up and down the hornblocks. This ensures that the axles will still be quite free when the engine runs over an uneven road. I have yet to see the small railway which is as level and even as a full-sized line! Next stage, wheels and axles.

L.N.W.R. Passenger Tender Locomotives

The recent withdrawal of the last "Claughton," the last "Prince" and the last "Precursor" means that there are now no L.N.W.R. passenger tender engines in traffic.

Thus it has come about that the old London & North Western Railway is not the first of the pre-grouping railways, since the Glasgow & South Western and the North Staffordshire railways have already had all their locomotives broken up, but the first of the major English railways to have this rather melancholy distinction. This is all the more remarkable in view of the former widespread popularity and, we must say, the notoriety of the one-time "Premier Line."

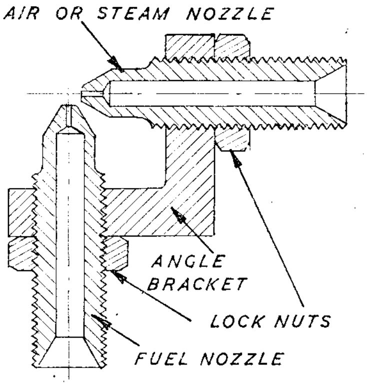
The express passenger engines of the L.N.W.R. were always the subject of discussion and, indeed, argument among locomotive enthusiasts. To many, the engines were undersized, inefficient, and therefore uninteresting; to at least as many others, the glorious recorded exploits of the never-to-be-forgotten "Jumbos," "Precursors," "Georges," "Experiments," "Princes" and "Claughtons" were thrilling to a degree. Even today, we know many an enthusiast, too young to remember the occasions, who can, nevertheless, thoroughly enjoy the excitement of an account of a run with a "George" hauling 440 tons from Crewe to Euston, 158 miles in something less than 145 minutes.

Whatever may have been the shortcomings, or otherwise, of the engines we have named, and to which we would add the equally-celebrated Webb compounds, there can be no question as to their having carved for themselves a niche in the temple of locomotive fame that will keep their memory green so long as locomotive history endures.

*UTILITY STEAM ENGINES

by Edgar T. Westbury

IN the design of atomising burners for operation with fluid pressure, i.e., compressed air or steam, the working principles are identical with those employed in toilet or medical spray atomisers, or paint sprayers, and their construction is also similar, apart from minor modification of detail. The simplest form of atomiser is that in which the jets for the liquid to be sprayed, and for the air or steam, are so arranged in juxtaposition that the discharge from the latter causes a depression of the atmospheric pressure in the region of the liquid jet orifice, so that liquid is



A simple form of atomiser

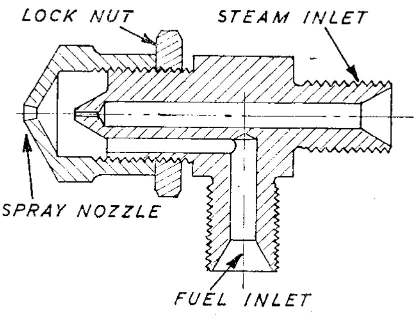
drawn from it by suction and promptly broken up and scattered in the path of the pressure jet. The two jets are usually placed at right-angles to each other as shown, though where extra lift force is required, it is an advantage to locate them at a more acute angle. Atomisers of this type are often used in the simpler forms of paint spray-guns, where their particular limitations are soon apparent if an attempt is made to use them with paint of a coarse or viscous nature ; their ability to pulverise the liquid to the ultimate degree of fineness is also limited, and cannot be improved to any great extent by increasing the spraying pressure. However, they will give reasonably good results in spraying light fuels of fairly low viscosity, such as paraffin, with quite a low spraying pressure, from about 5 lb. per sq. in. upwards.

The example of this type of burner shown in the drawing can be very simply made, and may serve as a basis for experiments by any readers who are interested in this subject. The two nozzles are identical except in respect of the size of the jet orifice, which is a matter for experiment, and are adjustably mounted in an angle bracket, which may be cut from a piece of angle section brass or steel. This enables the relative positions of the two jets to be adjusted to obtain the best results in respect of lift and atomisation (not always compatible factors) when they can be fixed in position by the lock-nuts. A fine thread, say ¼ in. by 40 t.p.i. is advisable, and the ends of the nozzles will then take a standard union-nut for connection to fuel and pressure lines.

A No. 80 drill will be found amply large for the pressure orifice when working on a low pressure range, and only a slightly larger drill will be required for the fuel orifice ; adjustment of size by broaching out the holes is nearly always found desirable to obtain the best results.

Injector Type Atomisers

A more efficient form of atomiser is that shown in the next drawings, which illustrates a type that I have used experimentally with great success. Readers will recognise the resemblance between this and the popular "M.E." paint spray-gun, from which, actually, it was evolved ; but a similar form of design is found in sprayers for a very wide variety of purposes, and the Blakeney burner, which has already been referred to in these articles, also works on the same principle. Such atomisers are more efficient, both in lifting and pulverising liquid, than the previously described type, and will deal with more



Atomiser of the injector type

viscous liquids if sufficient pressure is applied, while still being capable of working on low pressure for ordinary liquids. When the fuel is fed by suction, it is not generally necessary or desirable to attempt control or restriction of its flow, and there is no liquid jet orifice in the same sense as that of the previous example ; but for some purposes it may be found that much better burner control is obtained by feeding the fuel under gravity or pressure head, and interposing a fine adjustment stop valve in the fuel line.

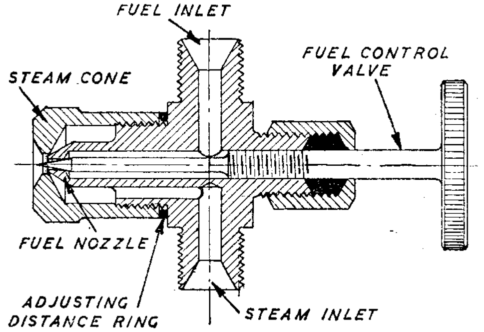
The pressure jet in this form of atomiser should be about the same size as that of the previous

*Continued from page 251, "M.E." August 25, 1949.

type for working on a similar range of pressure, but the orifice in the front spray nozzle, or "mixing cone" should be a good deal larger, and may be tapered as shown to facilitate the spray discharge. The position of this nozzle is very important; it must be in true concentric alignment with the pressure jet, and its distance from the latter will affect both lift and atomisation. It is, therefore, provided with means of lateral adjustment and locking, as shown.

Vortex Type Atomisers

In the device shown in the next drawing, the positions of the pressure and fuel orifices are reversed, the latter taking the inner position, with the pressure jet, of annular form, surrounding it. There are several practical advantages in this type of atomiser, one of the most important being that a powerful vortex is formed in front of the fuel orifice, which being straight and direct, can be controlled by a valve or modulating needle without undue jet friction or wiredrawing of the suction effect at this point. The spray tends to spread out at a wider angle than that of the previous types, resulting in a short flame which fills the furnace more completely, and its shape or cross-section may be controlled to a great extent by modifying the shape of the annular passage between the orifice in the steam cone and the tip of the fuel nozzle. If, for instance, the top and bottom of this annulus are blanked off, the cone of spray will be flattened out into a fan or "batswing"—a faculty often exercised in spray painting apparatus, by the way. The atomiser is suitable for either suction, gravity, or pressure feed without alteration, as the fuel supply is under direct and positive control. As the area of the pressure discharge annulus is determined by the relative lateral



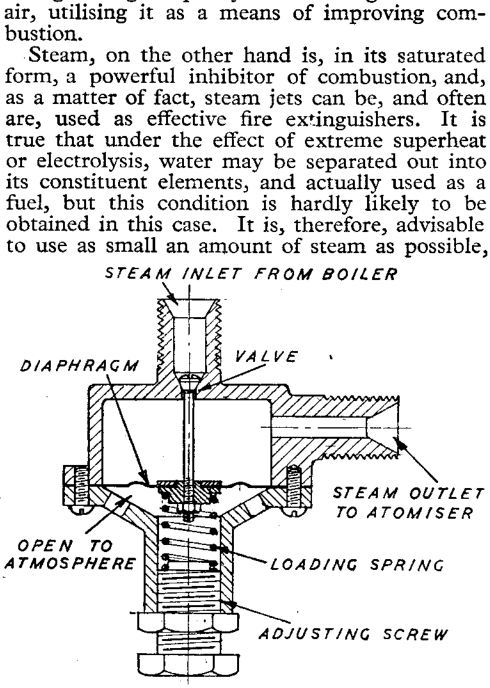
Vortex type of atomiser, with fine adjustment fuel control-valve

positions of the steam cone and the fuel nozzle, adjustment here is critical, but instead of using a lock-nut to fix this, a distance-ring, of a thickness determined by trial, is recommended as being better adapted to maintain exact concentric alignment of the two parts.

Pressure Supply

It has already been stated that either air or steam pressure can be used for operating any of the atomisers described. Air is really the easier of the two to use, as it is dry, or at least relatively so, and thus trouble with condensation or dribbling is eliminated. However large the volume of air used, combustion is not impaired, and indeed it might be good policy to use a large excess of air, utilising it as a means of improving combustion.

Steam, on the other hand is, in its saturated form, a powerful inhibitor of combustion, and, as a matter of fact, steam jets can be, and often are, used as effective fire extinguishers. It is true that under the effect of extreme superheat or electrolysis, water may be separated out into its constituent elements, and actually used as a fuel, but this condition is hardly likely to be obtained in this case. It is, therefore, advisable to use as small an amount of steam as possible,



A simple form of pressure reducing-valve

not only to avoid interference with the combustion of the fuel but also in the interests of economy. In a small and not very efficient steam generating plant, it is conceivable that the steam consumption of the burner may seriously deplete the supply available for driving the engine.

The burner should always be supplied with perfectly dry steam, and where moderate or high steam pressure is available from the boiler, say from about 80 lb. upwards, it is not generally advisable to attempt to work the sprayer at the full pressure, and some means of reducing the pressure supply to the latter is desirable. If the conditions of working, and rate of steam generation, are fairly constant, this can be done by no more elaborate means than a small bore control-valve or other restricting device in the pressure supply pipe. But if there is any likelihood of wide or rapid variation of boiler pressure, this simple expedient may be found inadequate. Spray atomisers demand a fairly constant pressure to work reliably without the need of readjustment, and in many cases where this condition is not obtained, they have been found troublesome or completely ineffectual. The use of an automatic pressure reducing-valve will enable the supply to the sprayer to be maintained absolutely constant under all conditions of fluctuating boiler pressure, and is strongly recommended in all cases where fast steaming water-tube or flash boilers are used.

(*Continued on page* 328)

The 1949 Exhibition Prize Winners

Championship Cups

Locomotives.—E. G. Rix, of Maidstone. 5-in. gauge 4-6-2 " Pacific " type passenger locomotive " Liberty."

Steam and Motor Ships.—T. Fletcher, of Colne. Working model of river and coastal tug boat " Chieftain."

Sailing Ships.—A. E. Field, of Walsall. Representative model of early 16th Century Spanish Carrack.

General Section.—E. H. Evans, of Sevenoaks. Model of North Scotland Hydro-Electric Board water-driven turbine.

Club Team.—The Birmingham Ship Model Society.

Silver Medals

R. D. Rowell, of Shoreham-by-Sea. " O " gauge ¼-in. scale 4-8-2 type steam driven locomotive.

R. D. Pochin, of Manchester. 7 mm. scale model of L.N.W.R. " Chopper " tank 2-4-0 locomotive.

D. M. Honeyman, of Upminster. L.M.S. ⅜-in. scale 12-ton fitted wagon.

E. N. Taylor, of Gosport. Waterline ship model T.S.S. " City of London."

W. C. Beaman, of Tooting, S.W.17. Model of Port Line motor vessel " Port Pirie."

D. S. Anthes, of Sheffield. Waterline model of S.S. " Beaconstreet."

C. J. Clarke, of Birmingham. Topsail schooner British coaster type.

F. W. Shipsides, of Portishead. Waterline model of Barquentine " Waterwitch."

P. M. Wood, of London, W.8. Model Barquentine " Morning Light."

D. NcNarry, of Barton-on-Sea. Model of " Cutty Sark," and full hull model of the " Golden Hind." (Two medals.)

R. L. A. Bell, of Yeovil. Four pole shunt wound generator.

C. W. Field, of Reading. Alfa-Romeo 158 racing car.

A. E. Bowyer-Lowe, of Letchworth. Universal rotating and dividing table.

S. A. Walter, of Wembley Park. 1936 Leyland " Cub " Fire engine with extending sliding carriage escape.

W. Stables, of Ulverston. Model of showman's steam roundabout with three-abreast galloping horses and cockerels.

Bronze Medals

W. H. Brittain, of Wellington. 3½-in. gauge ¾-in. scale coal-fired model " Royal Scot " locomotive.

D. E. H. Birse, of Seven Kings. EM (Fine) G.W.R. Brake 3rd coach and G.W.R. all 3rd coach.

E. G. Willsher, of Putney, S.W.15. 0-6-0 class " Q " S.R. goods locomotive.

H. G. Swarts, of Barry Dock. Model of the Mumbles lifeboat.

T. H. Vinnicombe, of Woodford Green. Thornycroft Air-Sea Rescue Launch.

O. P. Corderoy, of Isleworth. Model of steam cabin cruiser " Barbara."

R. Davey, of Feltham. Steam launch " Dolphin."

R. J. Collins, of Great Bookham. 50 gun ship of 1736.

C. S. Sandeman, of Balmore. Model of yacht " Colean."

J. N. Hampton, of Hampton. Hull model with sails of H.M.S. " Endeavour Bark " (1768).

M. Maltby, of Sheffield. Scenic setting of Ketch " Martinet."

R. Carpenter, of Brighton. Model of S.S. " Admiral Fraser " shown at buoy, loading crated cars.

T. L. Wall, of Elham, near Canterbury. Model of " Charles Galley " 1676.

R. A. Barker, of Sheffield. " Model Engineer " Beam engine (period 1840).

E. J. Newton, of London, S.W.9. Split single two-stroke compression engine.

F. G. Bettles, of Taunton. Scenic Burrell showman's engine.

W. H. J. Goatcher, of Petworth. Lathe apron for 3½-in. Drummond lathe, No. 1076.

A. E. Bowyer-Lowe, of Letchworth. "Eureka" electric clock.

F. D. Mallett, of Epsom. Cromwellian Gate-leg table, 3 Lancashire chairs, Irish Spinning Wheel.

D. Lovett, of Morden. Model Air-Sea Rescue Launch.

SPECIAL PRIZES

The A. J. Reeves & Co. Prize

£5 5s. *Voucher.*—A. C. Perryman, of Shoreham-by-Sea. 3½-in. gauge ¾-in. scale L.B.S.C.'s, " Maisie " (modified).

The " Wilwau " Prize

Set of castings for " Doris " locomotive.—G. Ruse, of Cobham. 3½-in. gauge L.B.S.C.'s 0-4-0 tank locomotive " Juliet."

The Kennion Bros. (Hertford) Prize

£5 5*s. Voucher.*—A. G. Burrows, of Weybridge. 5-in. gauge 1-in. scale L.B.S.C.'s " Minx " locomotive (unfinished).

The Ling First Prize

£3 3*s.*—C. Payne, of London, S.E.6. Railway signal interlocking frame.

The Ling Second Prize

£2 2*s.*—E. Prout, of Birmingham. One L.M.S. and one L.N.W.R. 12-wheeled dining car. 7 mm. scale.

The Hampshire Prize

£2 2*s.*—M. Maltby, of Sheffield. Scenic setting of Ketch " Martinet."

The Hadrill and Horstmann Ltd. Prize

The Horstmann " Pluslite."—J. L. Bowen, of London, N.W.3. T.S.S. " Awatea " waterline model.

The Lewis Prize
£3 3*s.*—S. A. Walter, of Wembley Park. 1936 Leyland "Cub" Fire engine with extending sliding carriage escape.

The Coronet Tool Co. Prize
"*Coronet*" *Home Cabinet Maker Combination Lathe.*—D. Lovett, of Modern. Model Air-Sea Rescue Launch.

The Chalborn and Plant Prize
"*York*" *2 in.* × *8 in. centre lathe.*—L. W. Warnett, of Wivelsfield. $2\frac{1}{2}$-in. gauge model of a 2-8-0 American Austerity locomotive.

The Quickset Toolholder Co. Prize
£1 1*s.*—D. Marr, of London, N.W.9. "C" spring pencil spring bow in brass; integral pattern pencil spring bow and integral pattern pen spring bow.

"The Model Railway News" First Prize
£3 3*s.*—R. D. Pochin, of Manchester. 7 mm. scale model of L.N.W.R. "Chopper" tank 2-4-0 locomotive.

"The Model Railway News" Second Prize
£2 2*s.*—D. M. Honeyman, of Upminster. L.M.S. $\frac{3}{8}$-in. scale 12-ton fitted wagon.

"The Model Railway News" Third Prize
£1 1*s.*—E. G. Willsher, of London, S.W.15. 0-6-0 class "Q" S.R. goods locomotive.

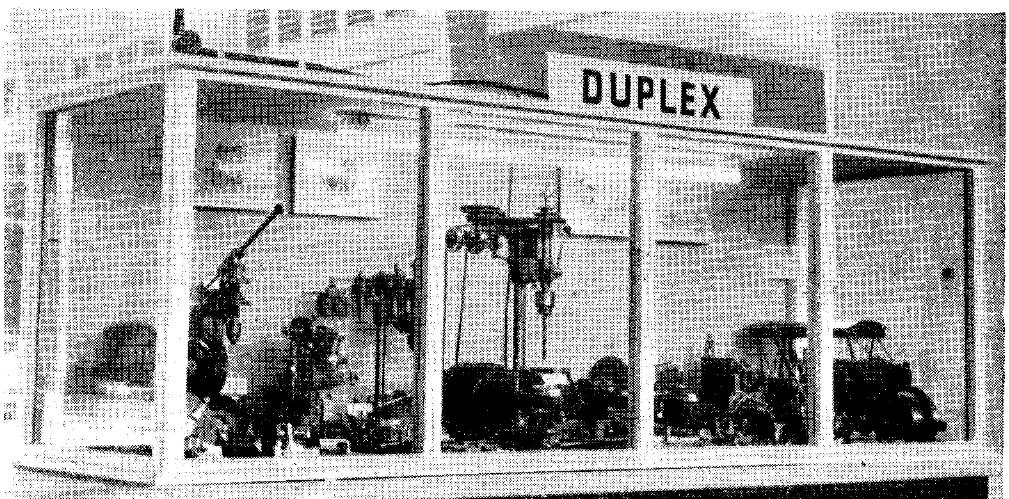
"The Model Car News" Prize
£5 5*s.*—F. J. Harvey, of Enfield. Model race car based on the "E" type $1\frac{1}{2}$-litre E.R.A.

The "Model Ships and Power Boats" Prize
£5 5*s.*—S. V. Hill, of Redditch. Cargo passenger liner built to "Penang" lines.

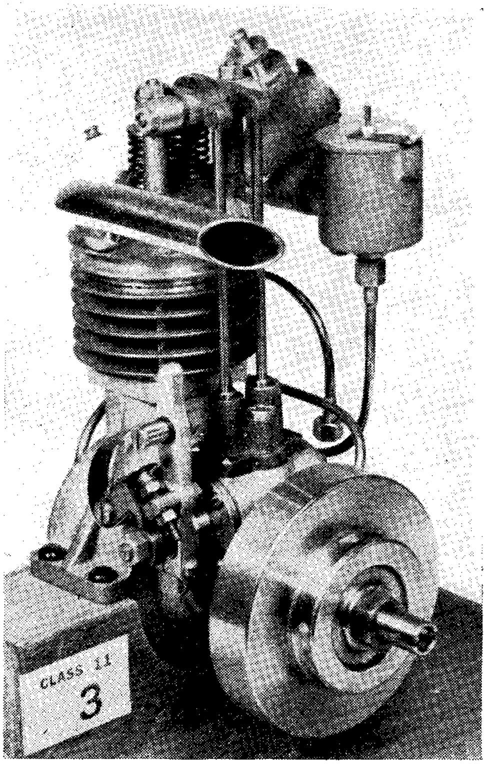
Diplomas
Very Highly Commended.—37 awards.
Highly Commended.—47 awards.
Commended.—17 awards.

The "Duplex" Exhibit

ONE of the most interesting amateur exhibits of tools and workshop equipment that has ever appeared at THE MODEL ENGINEER EXHIBITION was that staged by our contributors "Duplex." This consisted mainly of appliances which have been described in THE MODEL ENGINEER articles under the heading "In The Workshop," and a detailed description of these is, therefore, hardly necessary. The "Duplex" rear tool-post which has already become very popular among constructors, and forms a very useful addition to many of our readers' lathes, was shown in its original form and also with alternative heads for parting, boring, and for carrying milling and drilling spindles. The device for relieving the teeth of form milling-cutters, which has been the subject of a more recent description of THE MODEL ENGINEER was also shown, and in this case the ingenious method of operating the cutter mandrel was demonstrated by putting it in motion. It cannot be too highly emphasised how effective is a display of this nature for bringing home to THE MODEL ENGINEER readers the fact that the articles on workshop, and indeed all other topics published in the pages of THE MODEL ENGINEER, are eminently practical, and that our contributors practice what they preach. The workmanship shown in all these appliances, including even the minor fittings, was universally admired, no less so than the ingenuity of the devices and the versatility of their application. One visitor to the Exhibition was heard to remark "I think that these gadgets would do everything for you, except bring you up a cup of tea in the morning, and take the dog for a walk."



I.C. Engines at the "M.E." Exhibition



A 15-c.c. "Apex Minor" engine by T. Norris, of London, N.W.5

IN the model engineering world, i.c. engine enthusiasts are nowadays sharply divided into two different classes, those who use i.c. engines and those who build them, and, unfortunately, the rapid increase in the former class appears to be, to some extent at least, at the expense of the latter class. In the reports of previous Exhibitions, I have several times deplored the fact that the number of i.c. engines entered in the "M.E." Exhibition bears no relation whatever to their popularity, especially in connection with speed and other competition types of models, and in this year's Exhibition this tendency seems to be still more strongly marked. In the competition class for i.c. engines, only eight engines were entered, one of which had not arrived up to the time these comments were written, and five of the remainder were built from "M.E." designs, with or without additions or modifications. These included a 15-c.c. "Apex Minor" engine and carburettor, by T. Norris, of London, N.W.5, a 10-c.c. "Craftsman Twin" with centrifugal clutch and direct-driven road wheels, a 2.5-c.c. "Ladybird" c.i. engine, a 15-c.c. o.h.v. "Kittiwake" engine and a 10-c.c. "Ensign" two-stroke.

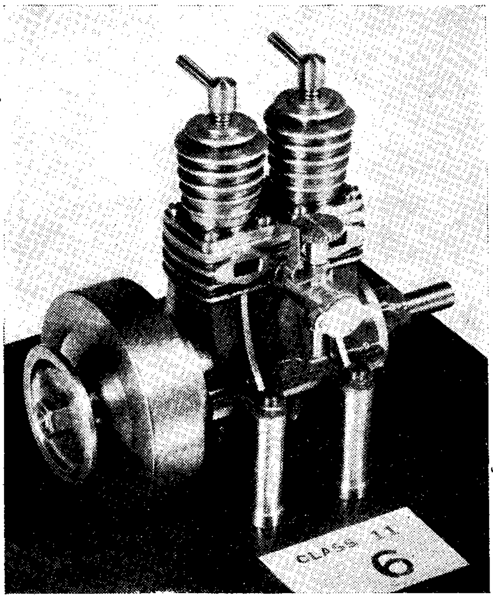
It may perhaps be appropriate to make a few comments on the design of the above engines, for although they have been fully described in the "M.E." in the past, it has been found by experience that any reference made to them nearly always excites the curiosity of readers who have not seen the original articles, and leads to a good deal of correspondence regarding the engine specifications, dates on which they were described, and the availability of the original issues.

The "Apex Minor" engine is a four-stroke engine of 1 in. bore and $1\frac{1}{8}$ in. stroke, having vertical overhead valves and upswept ports, giving free valve passages and large port areas. It was designed as an alternative to the "Kittiwake" engine, which will be referred to later, being of considerably lighter construction and simpler valve mechanism. It was described in the course of a series of articles on "Experiments with Four-stroke Engine Design," published during the latter end of 1944 and the beginning of 1945. The engine in question is a fairly good example of workmanship, but embodies few individual features which call for any comment.

The 10-c.c. "Craftsman Twin" engine is perhaps better known to readers because of its more recent introduction in the "M.E." at the beginning of last year. It is a horizontally-opposed twin two-stroke, with single crank chamber, and firing simultaneously on both the cylinders, producing a great improvement in dynamic balance as compared with a single-cylinder engine. The example by H. Rae, of Great Malvern, is very well made, and it is understood that it has been highly successful as a working model. In the arrangement of the engine for driving a racing car, the crankshaft of the engine virtually forms the axle of the road wheels, one of which runs free on the shaft and therefore transmits no power, the drive being taken on one wheel only through a centrifugal clutch of fairly orthodox type. It may be observed that opinions are divided as to whether a direct drive from the engine to the road wheels, without the use of any reduction gearing, is an efficient arrangement for a model racing car, owing to the high gear and consequent inability of the engine to produce its most efficient r.p.m., but it may be placed on record that some excellent results have been obtained with direct drive cars, particularly in the smaller classes.

The "Ladybird" engine is the latest engine design to be described in "Petrol Engine Topics," the description having been published between June and August of this year. The constructor of the example shown here, C. J. Potten, of Whitton, has evidently lost no time in constructing the engine, which is made from the die-castings as recommended in the articles. Again

the construction is apparently sound, though it is a rather unfortunate feature of these small engines, from the aspect of exhibition work, that all their best and most important workmanship must necessarily be completely concealed in the interior working parts, and very little idea of their merits can be obtained from exterior inspection.

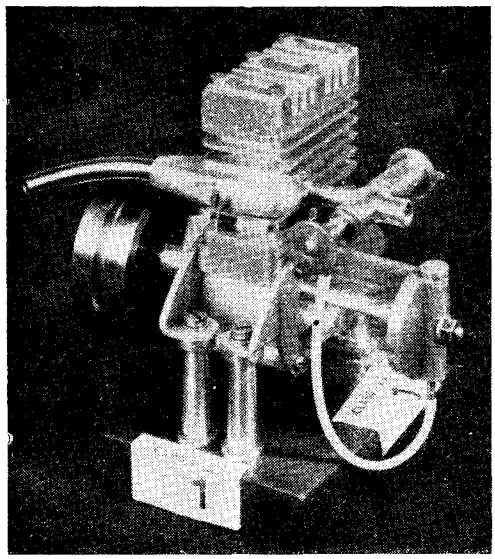


The "Ladybird" 2.5-c.c. engine, by C. J. Potten of Whitton

The 15-c.c. o.h.v. "Kittiwake" petrol engine, as exhibited by E. Hinchliffe, of Rochdale, is another design which has been very popular among constructors in the past, having been described in the same series of articles as the "Apex Minor" engine mentioned above. It is a direct development of the "Kiwi" 15-c.c. engine of the same bore and stroke, but with various improvements intended to promote efficiency, including forced lubrication and inclined valves, with enclosed rockers and push rods. Again it is difficult to judge the merit of this particular exhibit from external appearance, but the workmanship is conscientious and the salient features of the design have been carefully followed.

The 10-c.c. "Ensign" two-stroke petrol engine was described during 1947 in *The Model Car News* and was designed specially to serve as the power unit for the "M.C.N. Special" model racing car. A very large number of these engines have been constructed by readers of the "M.E." and "M.C.N.," not only for use in cars, but for other purposes, including model racing hydroplanes. Some notable successes have been obtained with them, particularly in the latter field. The present example is perhaps unique in having been constructed by a lady, Mrs. D. H. Duncan, of Worthing. It is certainly unusual for one of the fair sex to attempt the construction of this type of model; in fact, it has never happened before in my experience. It is not, however, necessary to make any allowances for the engine on these grounds, as the workmanship is all that can be desired, and I have no doubt whatever that the engine will work quite efficiently when put into service. I look forward, some time in the future, to seeing Mrs. Duncan running the engine in a model car or boat.

Two examples of original design are shown in this competition class, the first, a compression-ignition engine of 5 c.c. by E. J. Newton, of Stockwell, S.W.9, being a rather interesting type of engine which has come into prominence in recent years through its success in motorcycle racing, though the particular form of design is by no means new, having been exploited in this country as early as 1905; its possibilities for high efficiency, however, were not realised until very many years after, mostly in continental motorcycles. The split-single type of engine has two cylinder barrels to one combustion chamber, the barrels being arranged parallel to each other and usually, but not invariably, connected by a forked or otherwise articulated connecting-rod to a single crankpin, as is done in this case. The particular virtue of this arrangement for use in a two-stroke engine is that it gives the maximum separation distance between the transfer and exhaust ports, being equivalent to an



A 5-c.c. "Split-single" two-stroke c.i. engine, by E. J. Newton, of Stockwell, S.W.9

engine with an exceptionally deep deflector on the piston, but it further gives some advantages in the timing of the ports, and is the one type of "valveless" engine which can be really effectively supercharged. Even without supercharge, however, engines of this type have often been found to run more efficiently and economically than the normal type, due to the improved scavenging and reduction of mixture wastage. The example seen here is well made, so far as exterior

indications can be relied upon, and it is understood that, despite its small size, it is highly efficient. There is, however, some grounds for criticism regarding the size of the exhaust pipe, which appears small for a high-efficiency engine of this size.

The 10-c.c. racing car engine, made by the same constructor as the "Craftsman Twin" described above, has been machined entirely from solid aluminium alloy. Here again, the merit of the design cannot be definitely assessed, but must be judged on exterior workmanship, which is excellent. The design also appears to be good, the cylinder having exhaust ports disposed all round, and presumably transfer ports and passages to correspond, being in this respect similar to certain types of commercially-produced small engines, which have been highly successful. In other respects it follows the general tendencies in modern racing two-stroke engines, and is very robust in structure.

(To be continued)

"Duplex" Visits the Exhibition

THE Myford M.L.8 woodworking lathe to which reference was made last week, is shown in Fig. 1 in the process of turning a table leg of complex form with the aid of hand tools, and the action of the circular saw attachment and the angular sawing table is illustrated in Fig. 2, where the saw is shown cutting through a billet of 2½-in. square-section material. The adjustable spring-box now fitted enables the tension of the return spring to be set to provide a sensitive feed and an almost constant feed pressure. The depth of drilling can be determined from the scale inscribed on the collar fitted to the feed shaft, and in addition we were pleased to note that the jockey pulleys are now made of cast-iron instead of aluminium alloy.

Fig. 1. Turning a table leg in the Myford woodworking lathe

Fig. 2. Angular sawing in the Myford lathe

There are some notable examples of small drilling machines exhibited which are eminently suitable for use in the small workshop, and, amongst the larger machines of the original Driver-type, the "Startrite" drill appears to be an excellent example of clean design and good workmanship; although the lowest spindle speed of 480 r.p.m. may be found rather high where carbon-steel drills are used or heavy countersinking and counterboring operations are undertaken.

The ⅜-in. capacity Cowell drilling machine has recently been improved by fitting a square table, which not only simplifies the machining operations, but also provides a work table of more convenient shape and of larger area.

The sets of machined parts supplied by the makers will be welcomed by those seeking an interesting piece of work which, on completion, will provide the workshop with a reliable drilling machine.

A noteworthy little drilling machine, designed for watch and instrument making, is the "Waco" exhibited by Buck & Ryan Ltd. and depicted in Fig. 3. The chuck has a holding capacity of 3/32 in. and the spindle, which runs in white-metal bearings, is driven by a 1/50 h.p. motor of the universal type running at 20,000 r.p.m. Three spindle speeds are provided by the step-pulleys in conjunction with an endless round belt.

The "Flexispeed" hand-operated shaping machine illustrated in Fig. 4 has both a stroke and a traverse of approximately 5 in. The machine appears to be well finished and it should be a useful addition to this class of inexpensive tools.

The Acorn power-driven shaping machine, which was demonstrated in operation and is depicted in Fig. 5, would form a valuable addition

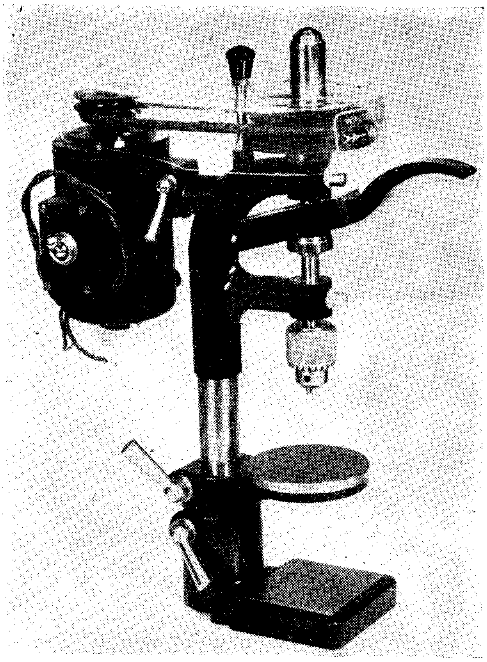


Fig. 3. *The Waco miniature drilling machine*

to the equipment of a workshop where machine slides and other long flat surfaces have to be machined.

This shaper can be used efficiently for a great variety of work, for the stroke of the ram can be varied from ½ in. to 7 in. and the cutting speeds from 3½ ft. to 100 ft. per minute.

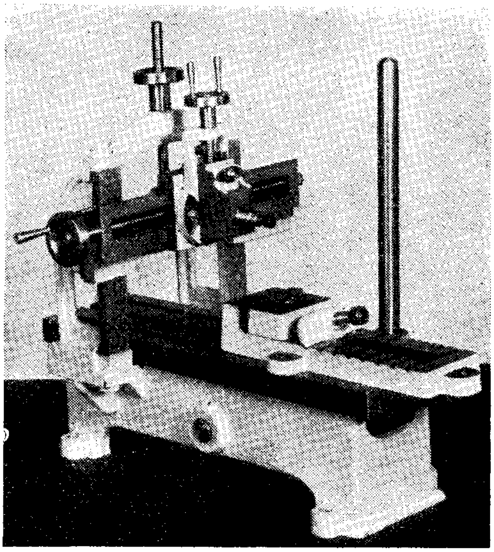


Fig. 6. *The Alton planing machine*

The work table, which has a traverse of 9⅜ in. and a rise and fall of 5 in., is provided with an automatic traversing gear, adjustable to give a feed in either direction of from 5 to 25 thousandths of an inch for each stroke of the ram. At some future time, we hope to describe this interesting

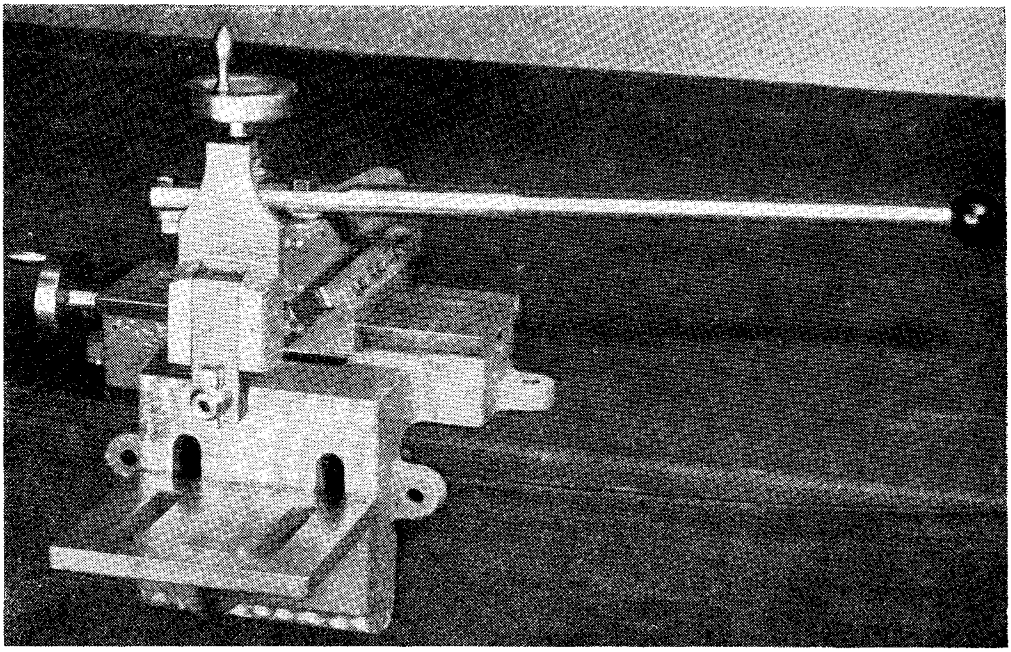


Fig. 4. *The Flexispeed hand shaping machine*

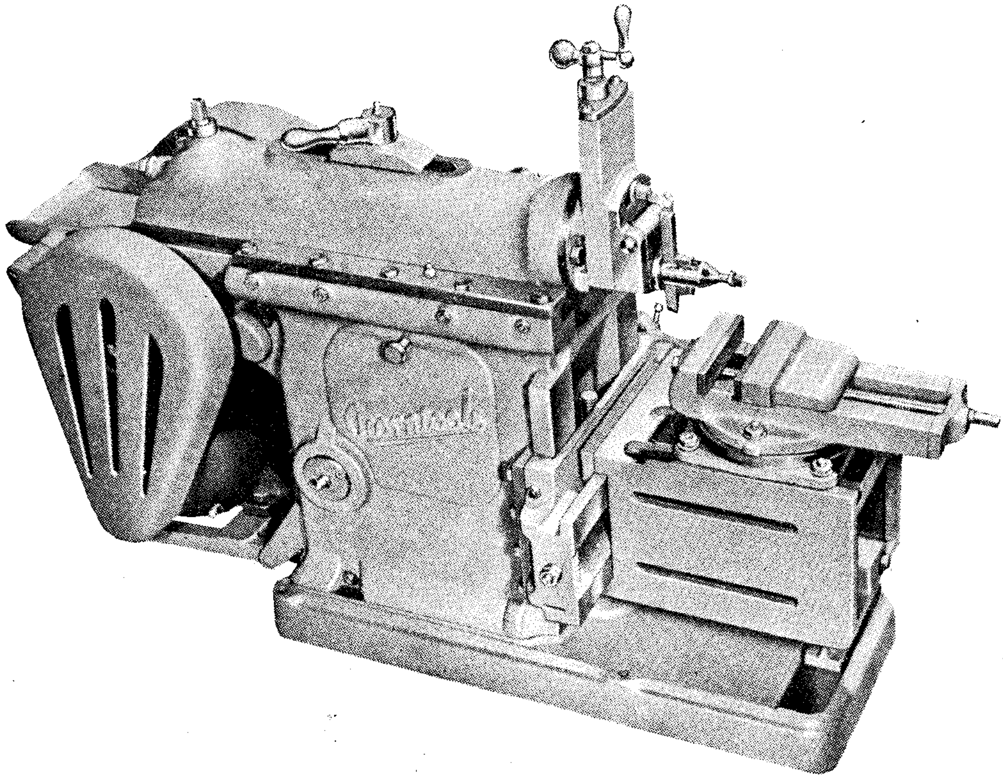


Fig. 5. The Acorn power-driven shaping machine

machine in greater detail after we have had the opportunity of submitting it to further tests.

Where work that is too long to be machined in the small hand-shaper of 5 in. to 7 in. stroke has to be dealt with, the Alton hand bench planing machine with its stroke of 14 in. should prove useful. This machine, which is illustrated in Fig. 6, appears to be of good conventional design and the parts everywhere well finished. The graduated vertical slide can be set over for angular cutting, and the swivel tool box is designed to afford relief for the tool on the return stroke. The machine slides are fitted with square-thread feedscrews and adjustable gib pieces are provided to take up wear.

(To be continued)

The Circular Track and Working Models Arena

Attracting immense percentages of the daily visitors to the "M.E." Exhibition, the Working Models Arena proved itself quite capable of creating a vast interest in the many fine models which were demonstrated thereon, and the running commentaries by a number of capable and well-known personalities enabled the public to get a very fair idea of what was taking place throughout.

The uncanny performances put up by the radio-controlled miniature D.U.K.W. are well worthy of mention, its operator skilfully coaxing it through many intricate manoeuvres. Not so fortunate were the attempts with the larger Land Rover model, but then with so delicate a mechanism it was only to be expected that certain snags would present themselves. The Radio-controlled Models Society, however, did some fine work and we hope that by next year they will have many more treats in store.

Enthusiasm ran high whenever the steam traction engines appeared, pulling quite creditable loads of varied cargoes! There appears to be little doubt that these models are once again becoming a popular subject for both discussion and modelling.

Some fine demonstrations were given by the Power Boat Section, and the model cars, somewhat advanced from those seen last year, amazed most spectators by their speed. An occasional plunge by the odd model or two into the tank proved of excellent entertainment value.

Last, but by no means least, were the demonstrations of stunt control-line flying. These were most aptly and skilfully executed, and the added attraction of two models performing in so confined an area brought gasps of appreciation from the onlookers.

The Model Locomotives

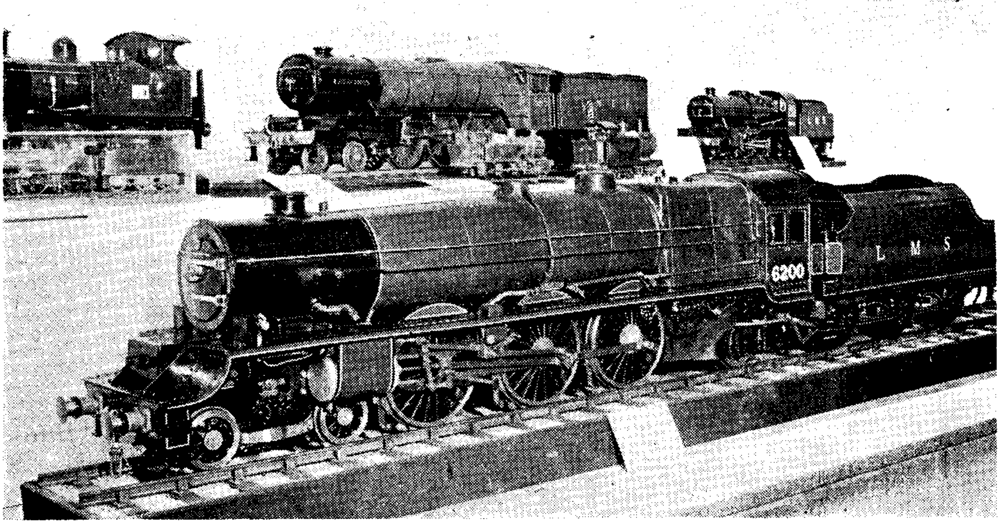
A FAIRLY uniform standard of quality was a noticeable feature of the steam locomotives this year; that is to say there was not a very great contrast between those which were good and those which were not good, and this was duly reflected in the judge's marking-sheets.

E. G. Rix's 5-in. gauge free-lance 4-6-2 engine won the Championship Cup, by a short head, so to speak; but the award was well-deserved, for the general design had obviously been worked out to produce a very well-proportioned engine combined with a view to its being easily handled when in steam. A few very minor faults could be detected; the cab look-out, for example, would be very awkward in a full-size engine, but that, obviously, is of no importance in operating a 5-in. gauge engine! But it is a point which a designer of full-size locomotives, even if designing a 5-in. gauge engine would not overlook. The marks awarded, however, were high, 85 per cent. for workmanship and finish, full marks for quantity of work and suitability of materials, and 83 per cent. for design.

A 5-in. gauge 0-4-0 saddle-tank from a design by J. H. E. Rodgers, of Leicester, and based on Bagnall's "Kenfig" class of industrial locomotives, won an H.C. diploma for its builder, J. F. Bruton, of London, S.W.6. It is a very pleasing little engine, closely following the prototype in all details, with simplicity, robustness and good appearance all very successfully combined.

Much the same can be said of another 0-4-0 saddle-tank engine, this time for 3½-in. gauge, and built by Dr. M. G. Baker, of Ashby-de-la-Zouch, from particulars taken from the actual prototype at Lount Colliery. It scored chiefly for its workmanship, finish and fidelity, which won it a V.H.C. diploma.

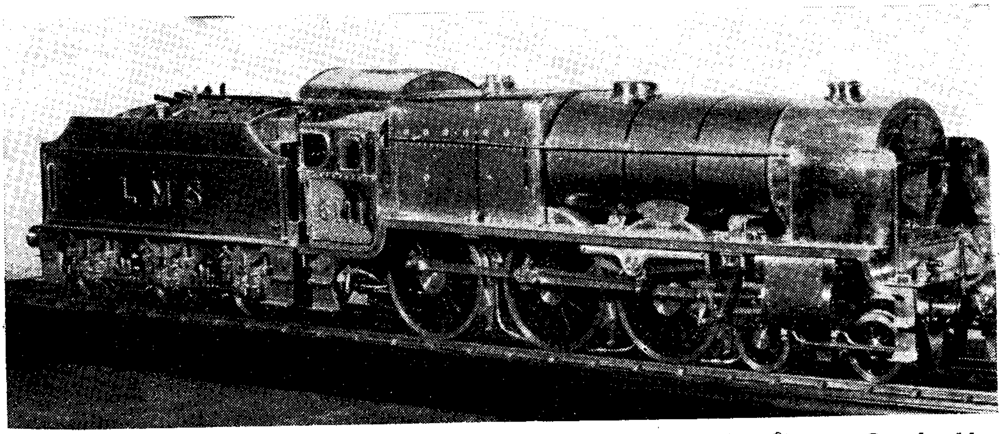
A. J. Webb, of Birmingham, entered a "Hielan' Lassie" built to the published "words and music" but slightly modified "to taste" and fitted with working steam brakes. The general finish was excellent, and a C. diploma was the award.



Model locomotives of various gauges on display

We feel we must offer an apology to V. E. Blyth, of Ilford, for our previous notice of his "Princess Royal" when we stated it was for 3½-in. gauge; it is actually for 5-in. gauge and must have given him a formidable problem to tackle, since his workshop is contained in a back garden shed. Its general quality, however, was just not high enough to gain it an award; but this, of course, can only be comparative, and we think the engine would give a very good performance on the track.

R. D. Rowell's "O"-gauge 4-8-2 type engine and tender caused the judges to "stare and wonder" for quite a while, as might be expected! It is based on a design by J. A. Josslyn, published by "L.B.S.C." some years ago and now fairly well known by its name *Ursa Maximus*. Mr. Rowell has left his model unpainted, so that the beautiful quality of the workmanship can be appreciated. This extraordinary little engine has three cylinders with valves operated by Walschaerts valve-gear, a coal-fired boiler and much very fine detail. All the nuts and bolts

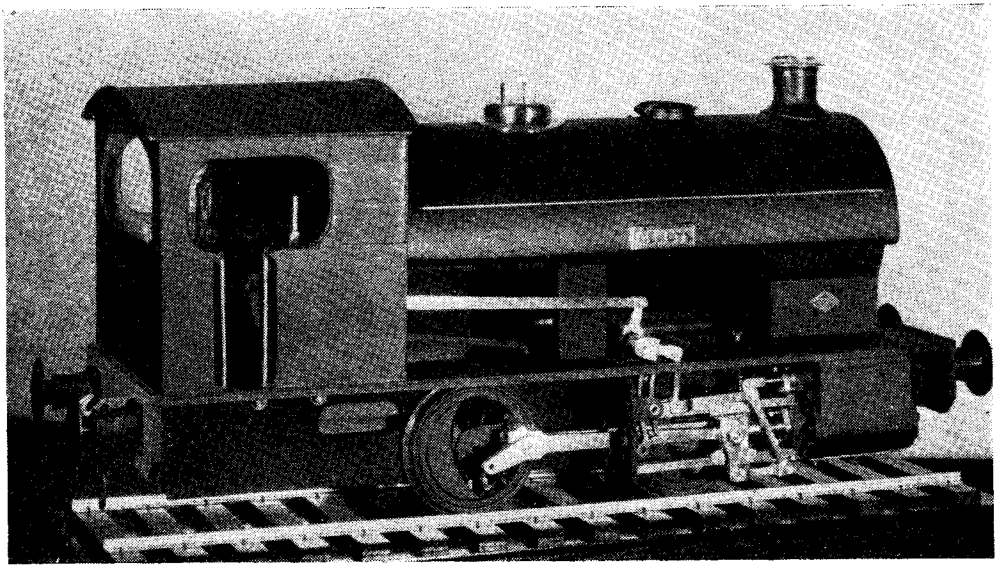


A 3½-in. gauge "Royal Scot" type locomotive made by W. H. Brittain, of Wellington. Completed but not painted, and shows admirable workmanship which won it a Bronze Medal

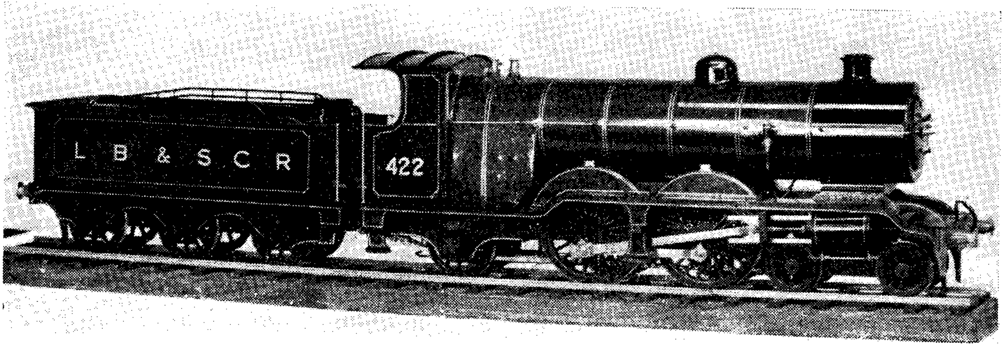
on it were home-made since nothing suitable could be found on the market. Nothing less than a Silver Medal could be awarded to such a job as this.

A. C. Perryman, of Shoreham-by-Sea, was once an apprentice in Brighton Works; so it is not surprising that when, years afterwards, he decided to construct a miniature locomotive he cast about for a "Brighton" prototype. What better than a Marsh Atlantic? The nearest thing to castings and parts for such an engine was the set for "Maisie," the fine G.N.R. Atlantic for 3½-in. gauge described by our good friend "L.B.S.C." So Mr. Perryman acquired a set of these and proceeded to work to the "words and music," slightly modifying the tune where necessary, to conform to Brighton, instead of Doncaster, practice. The result is quite a nice looking engine into which a lot of painstaking work has been put. It gained the prize offered by A. J. Reeves & Co.

The 0-4-0 tank engine "Juliet" made by Geoffrey Ruse, of Cobham, is one of the best of its kind we have yet seen. The neatness of finish and the quality of the workmanship throughout are highly satisfactory. She gained the "Wilwau" prize, a set of castings for "Doris," and we hope that Mr. Ruse will go



An 0-4-0 saddle-tank locomotive for 5-in. gauge, built by J. F. Bruton, of London. It is based on the "Kenfig" class of industrial locomotive built by Messrs. W. & G. Bagnall, of Stafford. It won a diploma for general excellence



A. C. Perryman's " Brightonised Maisie," which was awarded the special prize offered by A. J. Reeves & Co.

ahead with the construction of this popular 4-6-0 engine, maintaining the same high standard he has achieved in " Juliet," and the result should be well worth seeing.

A 3½-in. gauge free-lance 0-6-0 side-tank engine by A. L. Clarke, of Horsham, is a well-proportioned and nicely finished job which gained an H.C. diploma. It embodies a new kind of exhaust drain, designed to prevent the emission of water and oil from the chimney ; but we would like to see this in action before commenting on it.

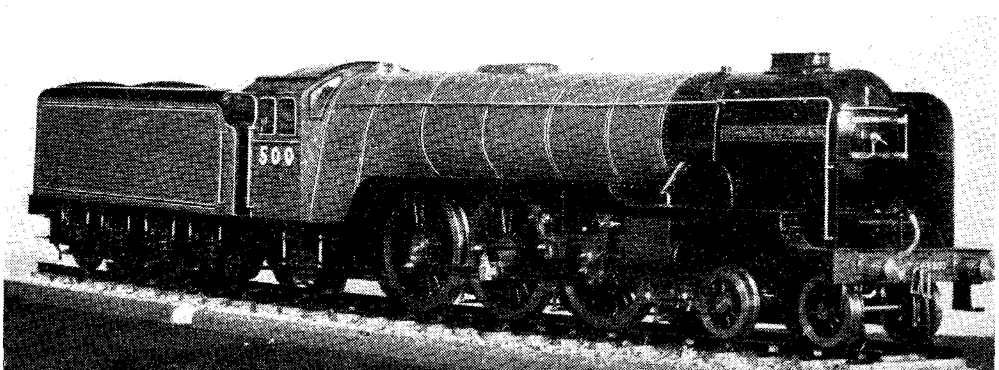
H. F. Hillyer, of Leatherhead, favoured " Hielan' Lassie " and has built a very fine example embodying some modifications of his own ; in addition, it is his first attempt at model engineering, so the result is decidely of more interest than it might otherwise have been. The plate-work is very fine, but the most astounding touch of realism to the whole engine, is the riveting round the smokebox wrapper-plate and the footplating. A well-deserved V.H.C. diploma was the award in this case.

A 3½-in. gauge free-lance 4-6-0 locomotive built by L. Raper, of Wakefield, possesses several interesting features. In general design, it follows the L.M.S. " Class 5," but it is fitted with Baker valve-gear. Its equipment includes working steam brakes and a " Weir " duplex donkey-pump for feeding the boiler. There is also a hand-pump in the tender. The workmanship is good, and the engine should be a useful unit on the track. It was awarded a C. diploma.

W. H. Brittain, of Wellington, was responsible for the only model " Royal Scot " in this particular class of the competition ; but the model, which is for 3½-in. gauge, is certainly a very nice one, though we would prefer to see it properly painted rather than a glory of highly-polished brass, copper and steel ! However, in spite of this and a few other questionable features for which, however, Mr. Brittain may not be entirely to blame, this fine model won a Bronze Medal.

A 5-in. gauge 0-6-0 " Minx " built by A. C. Burrows, of Weybridge, is the first which has been seen at the " M.E." Exhibition. It is certainly a fine piece of work, built strictly to the instructions of " L.B.S.C." ; it was awarded the Kennion Prize and a V.H.C. diploma.

(To be continued)



Mr. H. F. Hillyer's "Hielan' Lassie " in which a few slight deviations from the " words and music " have been made. But it is certainly a very fine " first attempt " on the part of its builder

IN THE WORKSHOP

by "Duplex"

*45—Graduating the Lathe Tailstock Barrel

THE practice of graduating the tailstock barrel as an aid to drilling to a required depth has been adopted by some lathe manufacturers; but where this has not been done by the makers the work can readily be carried out by the owner, and both the utility and the appearance of the tailstock will be enhanced thereby if a little trouble is taken to work methodically.

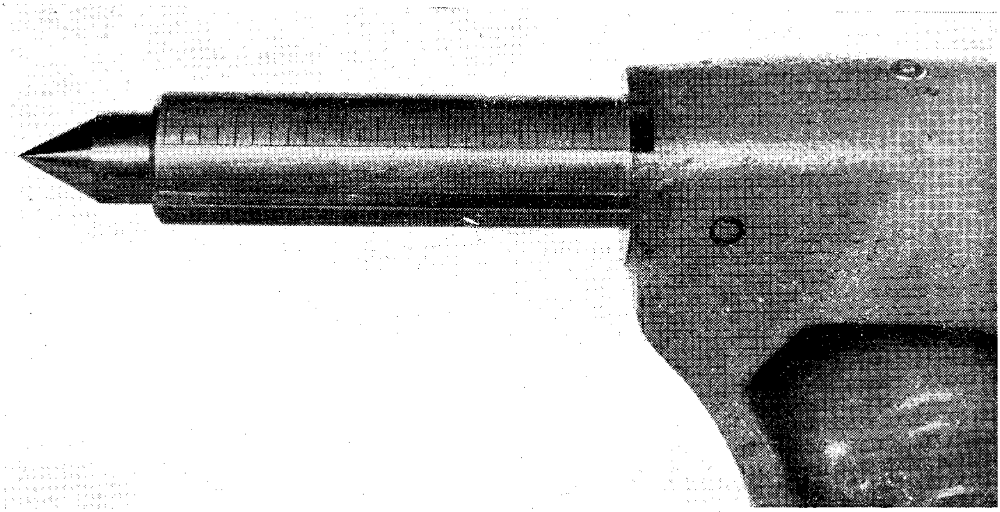


Fig. 1. The graduated tailstock barrel

The photograph, Fig. 1, shows the tailstock of the Myford M.L.7 lathe graduated in our own workshop by the method here described.

Clearly, the tailstock barrel could quite well be graduated, at a price, if sent to an engineering firm, but this would deprive the owner of the satisfaction gained from doing the work himself and at the same time carrying it out exactly as he wishes.

Now, the main purpose of graduating the tailstock is to enable drills and other tools, such as D-bits and counterbores, to be fed into the work for an exact distance. For the most part, this work will comprise entering a drill, mounted in the tailstock chuck, for a specified distance under the control of the tailstock feed mechanism. Under these circumstances, however, it will be difficult or even hardly possible to estimate exactly what is the zero position of the drill in relation to the work, or precisely at what point the drill begins to cut to its full diameter ; for in the first instance the drill point usually engages a hole previously drilled with a centre drill, and in the second case it only becomes apparent that the full diameter has been reached when the parallel portion of the drill has entered for some distance. From what has been said, it will be evident that advantage can seldom be taken of any very fine graduation of the tailstock ; nevertheless, the tailstock itself has all the essential features of a micrometer, for single turns of the feed wheel correspond with the major divisions of the scale, and subdivisions on the rim of the feed wheel are comparable with the minor graduations on the micrometer thimble.

In the present instance, as the pitch of the tailstock feedscrew is $\frac{1}{8}$ in., each revolution of the feed wheel will advance the barrel exactly $\frac{1}{8}$ in. and, as the wheel has four spokes, the registration of these with a fixed mark will indicate 1/32 in. of feed. If the tailstock feed mechanism is utilised in this way, $\frac{1}{8}$-in. divisions are inscribed on the barrel and any finer readings are taken from the position of the feed wheel itself. By this means, the scale lines on the tailstock barrel are widely spaced and easily read, whereas, were subdivisions of $\frac{1}{16}$ in. and 1/32 in. inscribed in this situation, quick and precise reading would be more difficult and confusion might easily arise.

It has been suggested that, as in a micrometer, the feed wheel should be graduated to enable measurements of a thousandth of an inch to be made, but it is not readily apparent when and how such fine readings could be utilised.

The method here suggested for indexing the feed wheel is illustrated in Fig. 2. A flat or other

mark is made at the centre of one of the spokes, and the screw securing the thrust tongue in the barrel is used as the fixed index mark.

As will be seen later, when these two marks are set to correspond, the $\frac{1}{8}$-in. graduations of the barrel will at the same time register with an index face formed on the nose of the tailstock casting.

Now, in the present instance, the diameter of

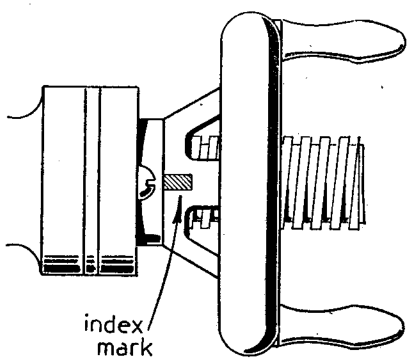


Fig. 2. View of tailstock, showing index mark on hand wheel

the feed wheel at the site of the index mark is $1\frac{3}{4}$ in. and the width of the spoke is $\frac{5}{8}$ in.; it follows, therefore, that, by turning the wheel to bring the edge of the spoke, instead of the index mark, opposite the screw-head, the tailstock barrel will advance approximately 7 thousandths of an inch. This goes to show that, with ordinary care, the depth of drilling can be regulated very accurately when increments of 1/32 in. are required; and beyond this, decimal parts of an inch can be estimated with reasonable exactitude by reference to the position of the feed wheel spokes in relation to the fixed index mark.

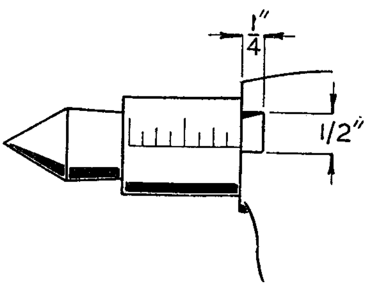


Fig. 3. Showing position of graduations and index bevel

Now that the underlying principles involved have been considered, the next step is to apply them in carrying out the necessary work on the tailstock.

Marking the Hand Wheel

Any one spoke is selected to carry the zero index mark, and for this purpose its surface over a small area is filed to a good finish. The mark itself may take the form of a line, or a small countersunk hole drilled with a centre drill having an $\frac{1}{8}$-in. diameter body will give a good appearance to the work and can also be easily read.

If a line is preferred, some difficulty may be experienced in forming it neatly in this rather awkward situation, but it can quite well be engraved with acid in the manner previously described for marking hardened steel gear-cutters.

Graduating the Barrel

To ensure that the divisions cut on the tailstock barrel are in step with the zero marked on the wheel spoke, the feed wheel is turned to bring its index marks into line and, at the same time, the barrel should project some $\frac{1}{16}$ in. from its housing. A line is then lightly scribed on the barrel against the nose of the casting to denote the position of the first graduation line, as shown in Fig. 3; this scribed line will be referred to later when the actual machining operation is described.

At this stage, it is advisable to mark-out with a grease pencil the position of the base line for the graduations, and also to indicate that these graduations are cut above the base line; the importance of this is that workers, being misled by the inverted position of the barrel during the machining operation, have cut the scale lines upside-down. The grease pencil mentioned is the kind commonly used in the laboratory for writing on glassware, but these will equally well mark metal surfaces and are far superior in this respect to ordinary chalk.

Although grease pencils can be obtained in several different colours, the blue marking shows up best on most metals.

The next step is to mount the barrel in the lathe so that the leadscrew feed with the aid of its index can be used to space the graduations accurately. For this purpose, the barrel is withdrawn from its housing, and the register peg

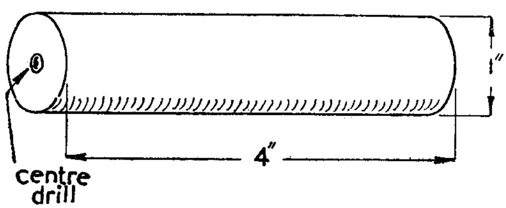


Fig. 4. Dummy tailstock barrel

fitted to the bore is also removed. A length of round brass or steel, which fits the bore of the tailstock casting, is then gripped to run truly in the four-jaw chuck and, after it has been faced, a centre is formed in its end with a centre drill, as illustrated in Fig. 4. This component is inserted in the tailstock, where it can be clamped in place to form a guide centre for the ordinary coned centre now fitted to the tailstock barrel.

The barrel is next secured by its threaded end to run truly in the four-jaw chuck and, at the same time, the improvised back centre is engaged and firmly clamped in position. The situation at this stage is represented in Fig. 5.

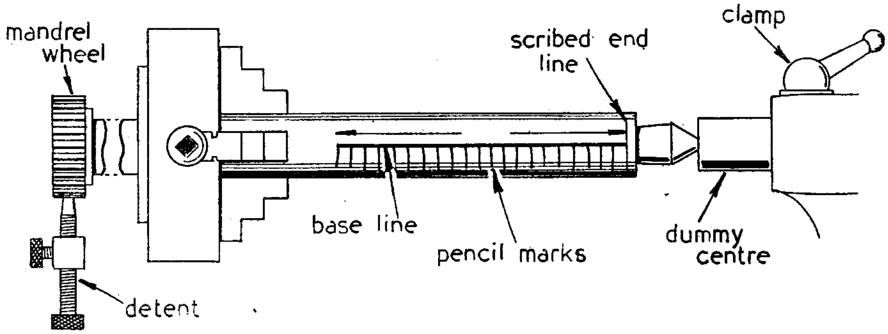


Fig. 5. Tailstock barrel mounted in the lathe for machining

The correct centring of the barrel by means of the test indicator is of the greatest importance, for, if this is omitted, the graduation lines when cut may be of unequal depth and width throughout their length, and they may also vary in these respects from end to end of the scale.

For cutting both the base and the graduation lines, a V-tool is used when mounted at centre height in the lathe toolpost.

If the included angle of the V is made equal to about 45 deg., deep but narrow lines will be cut, thus making for easy reading and giving a pleasing appearance to the work.

The sharp edge at the tip of the V should be removed with a few strokes of an oilstone slip to give greater strength to the cutting edges, but in doing this, care must be taken to preserve the clearance angle at the front of the tool.

When cutting the base line, the tool is clamped on its side at centre height and with the cutting edge facing the tailstock.

To locate and fix the barrel while cutting the base line, some form of mandrel lock is required, and the arrangement previously described of securing a change wheel to the tail of the mandrel, and locating it with a detent, will serve this purpose well.

The lathe mandrel is rotated to bring the base line, drawn on the barrel, level with the tool point, and it is then locked in this position.

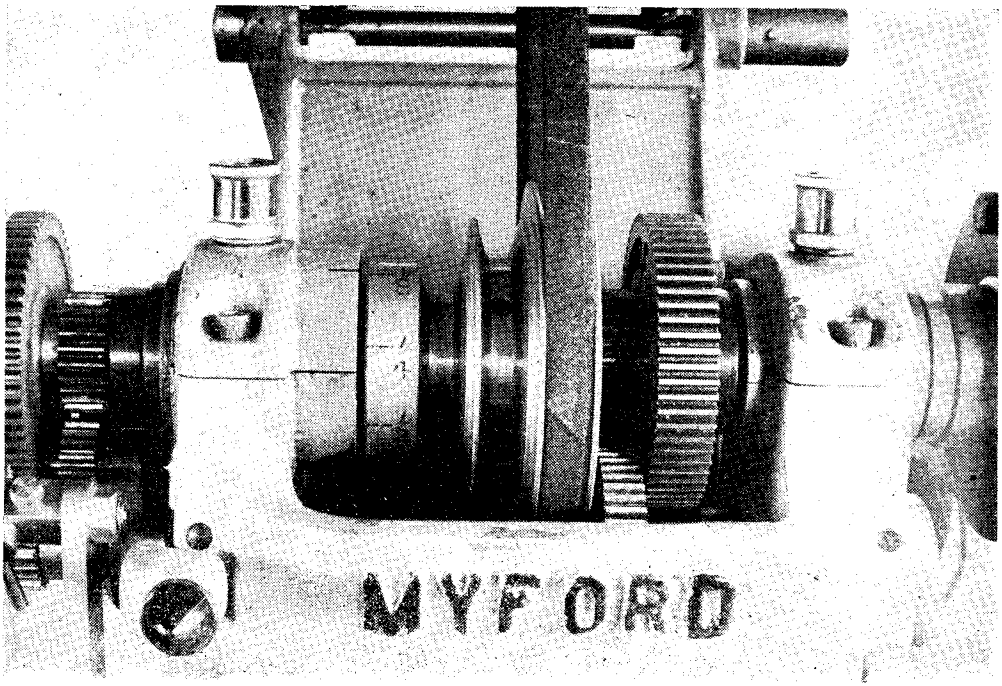


Fig. 6. Showing the method of marking the zero and index lines

Although it will be sufficient to make the scale itself 3 in. in length, the base line must be started farther back to enable it to be machined correctly. This is done by feeding the tool up to the barrel at its left end and then setting the cross-slide index to zero; the tool is now fed in gradually for a distance of two thousandths of an inch as it is traversed towards the right, so that the full depth is cut by the time the beginning of the scale is reached. The tool must be stopped in a position some 5 thousandths of an inch beyond the limit line previously scribed on the barrel; this is to allow the tool to enter the base line correctly when the vertical scale lines are later machined.

This procedure is then twice repeated, with an in-feed of 1 thousandth of an inch each time, to bring the total depth to 4 thousandths and thus complete the machining of the base line.

Before the vertical scale lines are cut, their length must be decided upon either by reference to a standard rule, or by setting out the graduations on the drawing board, to obtain an easily-read scale of good appearance.

The following dimensions have been found to fulfil these requirements :—

Dimension denoted	Length of line	Distance on pulley
$\frac{1}{8}$ in.	$\frac{1}{8}$ in.	$1\frac{3}{4}$ in.
$\frac{1}{4}$,,	$\frac{3}{16}$,,	$2\frac{5}{8}$,,
$\frac{1}{2}$,,	$\frac{1}{4}$,,	$3\frac{1}{2}$,,
1 ,,	$\frac{5}{16}$,,	$4\frac{3}{8}$,,

The lines are cut by mounting the tool with its cutting edge facing downwards, and then rotating the lathe mandrel for an angular distance corresponding with the length of each line.

Although this can be readily carried out by employing a mandrel dividing-head, a simpler method is to rotate the mandrel for the requisite distance by means of the back gear. The latter method gives a drive reduction of approximately 6 : 1, so that not only is very little operating pressure required, but any errors made in the amount of rotation are reduced in the same ratio.

To put this method into practice, the mandrel remains locked by its detent, and, as illustrated in Fig. 6, zero lines are drawn with the grease pencil on both the headstock casting and the cone pulley. From the zero line on the cone pulley the distances given in the third column of the Table are then marked off with the aid of a flexible rule.

These distances are calculated by dividing the diameter of the cone pulley by the diameter of the barrel, and then multiplying the dividend by both the drive ratio and the length of the line required.

In the present instance :—

Diameter of cone pulley flange	=	$2\frac{5}{16}$ in.
Diameter of tailstock barrel	=	1 in.
Back gear ratio	=	6 (5.96)

Therefore, the distance the pulley is turned to mark the $\frac{1}{8}$-in. line

$$= \frac{2\frac{5}{16}}{1} \times \frac{6}{1} \times \frac{1}{8} = 1\tfrac{47}{64} \text{ in.}$$

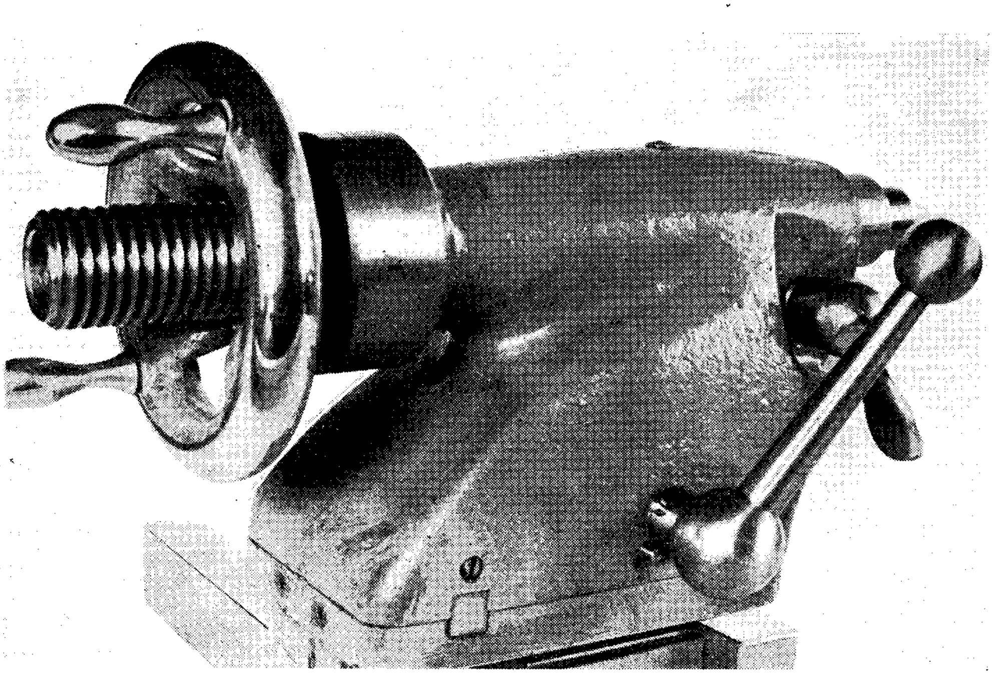


Fig. 7. Stop pins controlling movement of tailstock clamp lever

This figure is corrected to the nearest 1/64 in., making 1¾ in.

It will be apparent that, as the distance the cone pulley has to be rotated is very much greater than the length of the scale line, the possibility of making any material error in operation is considerably reduced.

To cut the graduation lines, the tool is first fed against the work and the cross-slide index is set to zero. The mandrel detent is then engaged in its former position and, with the lead-screw index turned to zero, the point of the tool is engaged exactly in the right-hand end of the base line. This is done by adjusting the setting of both the top- and the cross-slide.

Next, a cut of 2 thousandths is put on with the cross-slide, that is to say, its index is turned this amount beyond the zero mark.

The mandrel detent is then freed and the cone pulley is rotated with the fingers until its 1-in. pencil mark registers with the zero line on the headstock casting. This procedure is twice repeated with an added in-feed of 1 thousandth inch in each case to complete the cutting of the first line.

The tool is now withdrawn, the leadscrew is turned through an exact revolution, and, when the detent has been engaged, the tool point is entered in the base line to enable the next graduation line to be cut in a similar manner.

When cutting the lines, it will be found that, owing to the low drive ratio, very little finger pressure is required to turn the cone pulley or to stop it at exactly the right point.

On completion of the machining, the burrs set up by the tool should be broken off with a piece of brass and the work surface smoothed with an oilstone slip; finally a strip of worn abrasive cloth may be used to restore the appearance of the barrel. If the work has been carefully carried out, inspection, even with a hand lens, should not bring any faults to light. To enable the graduations to be easily read close to the nose of the tailstock, a flat or bevel is formed on the casting as shown in Figs. 1 and 3.

The flat should be marked-out with the barrel in place so that the bevel is sited directly opposite the scale lines. The surplus metal can be cut away with a small hacksaw, leaving the surface to be brought to a good finish with a fine file.

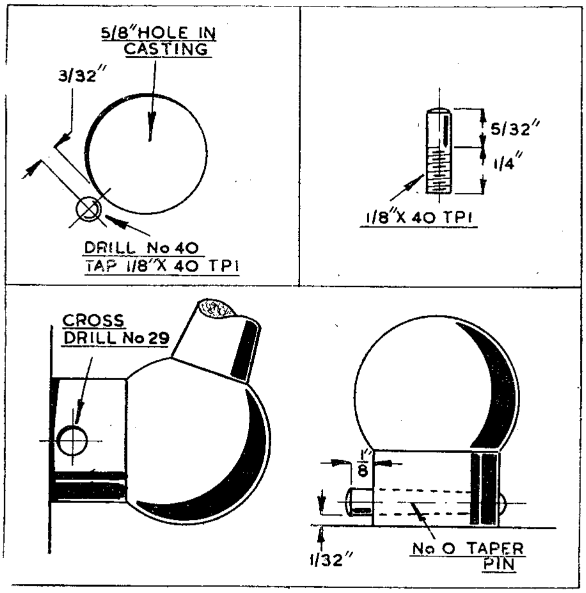


Fig. 8. *Details of clamp lever stop pins*

A Stop Pin for the Tailstock Clamp Lever

It may be found that when the tailstock clamp lever is released, it tends to fall below the surface of the lathe bed, and at times this may mean groping for its recovery.

This can be readily overcome, as shown in Figs. 7 and 8, by fitting pins to limit the movement of the lever, for the distance the lever has to travel to free the tailstock is quite small. A small taper pin fitted in a cross-drilled hole will serve for the peg at the base of the lever, but the pin fitted to the casting should be threaded and screwed into place; this form of construction allows either peg to be easily removed if required, which would not be the case were the pins driven into blind holes.

The exact location of the stop pin fitted to the casting is immaterial, for within limits the travel of the clamp lever can be varied by adjusting the thrust-nut, bearing on the clamp-piece fitted between the bed shears. This nut should be adjusted so that the tailstock is just free to slide when the clamp lever is in contact with its stop pin

Traction Engine Drawings and Castings

Mr. A. J. Every, 33, Williams Road, Ealing, London, W.13, has designed a 1½-in. scale Burrell single-crank compound traction engine for which he can supply blueprints and castings. We have inspected a set of blueprints which consist of four sheets giving the general arrangement in side and end elevations and half-plan, as well as the principal details for a very handsome engine. The castings are excellent.

The design has been worked out in such a manner as to keep all machining operations as simple and straightforward as possible while preserving the external appearance of the prototype.

We think that there are many traction engine enthusiasts who will welcome the opportunity of being able to build a not-too-elaborate but very good-looking engine.

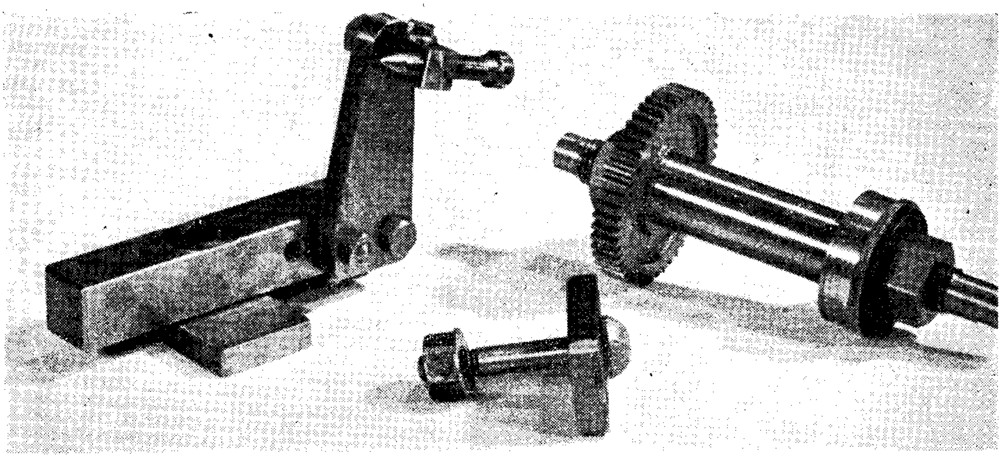


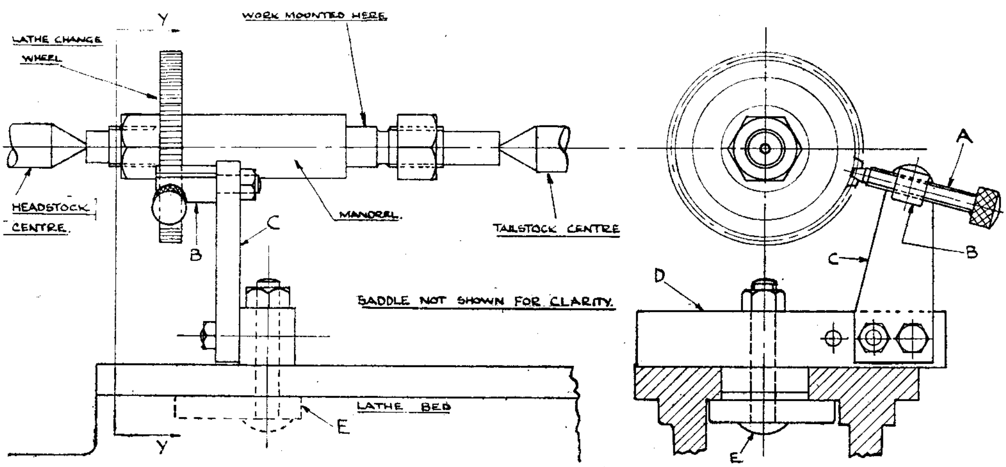
Photo by] [*Montague Fisher Ltd.*
Left : *Cross bar and indent bracket.* *Centre* : *Clamp plate.* *Right* : *Mandrel with gear, and the finished index ring*

Simple Dividing in the Lathe

by J.K.M.

SOME time ago the writer was asked by a friend to carry out some dividing on a few components which had already been partly made. The work as supplied is shown in Fig. 1, being a brass ring, to be divided into fifty divisions, and a steel sector to be divided into eight parts, each division representing 6 deg.

A Myford M.L.7 lathe was used to do the work and since at that time a dividing gear was not available, reference was immediately made to the article by "Duplex" in THE MODEL ENGINEER for March 24th, 1949. This article shows how a standard lathe change-wheel is secured to the end of the headstock mandrel to act as a division plate, and a detent bracket is fixed to the existing studs at the end of the bed of the lathe. This is undoubtedly an excellent arrangement but, in the writer's case, it was not favoured for two reasons. First, it necessitates stripping down the change-wheels and this was not desirable at the time. Secondly, the writer likes to use mandrels so that work may be mounted between centres. A fairly large selection of these useful items was on hand, and in any case it was known that two of the three brass rings shown in Fig. 1 were not exactly true with the bore, so



ELEVATION. *Fig.* 2. SECTION YY

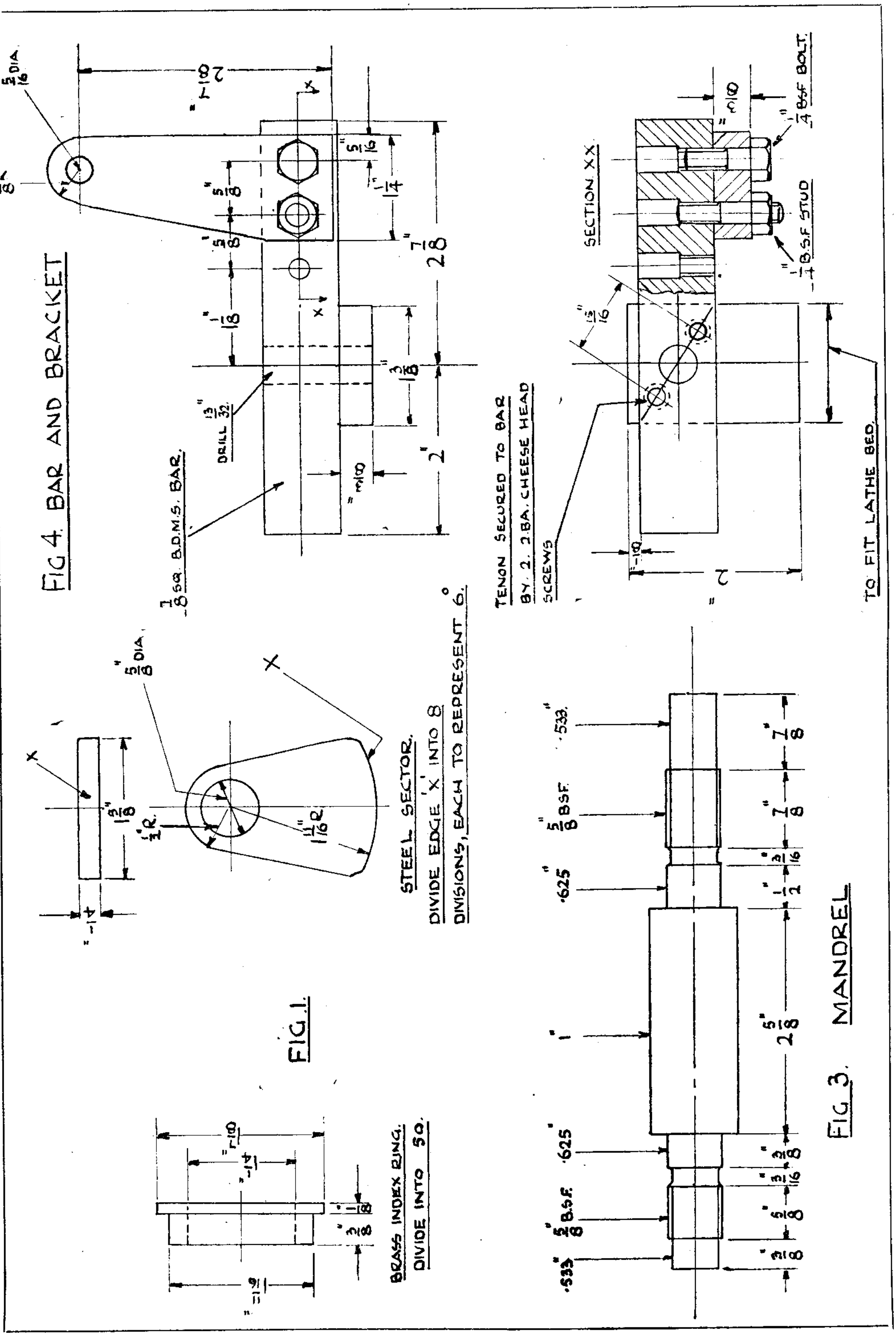


FIG 4. BAR AND BRACKET
1 7/8 SQ. B.D.M.S. BAR.
DRILL 13/32
SECTION XX
1/4 B.S.F. BOLT.
1/4 B.S.F. STUD
TENON SECURED TO BAR
BY 2. 2 B.A. CHEESE HEAD
SCREWS
TO FIT LATHE BED.
FIG. 1.
STEEL SECTOR.
DIVIDE EDGE 'X' INTO 8
DIVISIONS, EACH TO REPRESENT 6°.
5/8 DIA.
1 11/16 R.
BRASS INDEX RING.
DIVIDE INTO 50.
FIG 3. MANDREL
5/8 B.S.F.
.625
.533

it seemed obvious to mount them on a mandrel and true them up before carrying out the engraving operation.

It was therefore decided to apply the apparatus described by "Duplex" to a mandrel, instead of the headstock spindle, mounting a change-wheel at one end and the work at the other. This made it necessary to have a bracket mounted on the lathe bed to carry the detent, and the arrangement is shown in Fig. 2.

"Duplex" drawings were worked to in making the detent "A" and the pillar "B" (see page 341, THE MODEL ENGINEER, referred to previously). The vertical bracket "C" resembles that designed by "Duplex" but is without the curved slot. This bracket can be mounted in one of two positions on the bar "D," which is clamped to the lathe bed by a plate and bolt "E." The two positions of the bracket "C" have been arranged so that the detent will conveniently engage with all the standard change-wheels from 75 to 30 inclusive.

Working drawings of the parts as fitted to the M.L.7 lathe are shown, though these could be readily modified to suit other lathes of a similar size. Mandrels will, of course, vary with the work to be done, but the one shown in the drawings has proved useful for quite a large range of work, collars and suitable washers being made to suit jobs which do not readily fit on the $\frac{5}{8}$ in. diameter portion. All the rest of the work is quite straightforward. It should be noted that the tenon is fixed to the cross bar by two 2-B.A. screws, the heads of which are sunk in a pair of counterbored holes in the tenon. Dowels may also be fitted if desired. When indexing, the lathe spindle is not rotated, the work mandrel revolving on "dead" centres. The latter should, therefore, be in good condition.

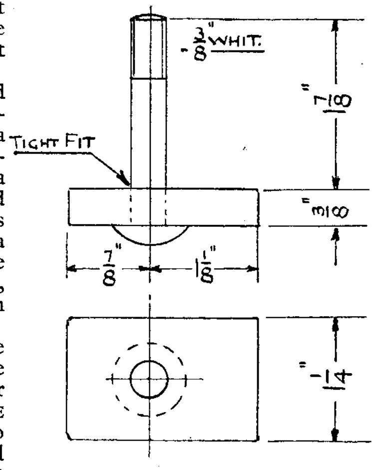


Fig. 5. *Clamp plate*

The work shown in Fig. 1 was divided using a 50-tooth wheel and indexing one tooth at a time, the line of the work being engraved with a sharp "V"-pointed tool as described by "Duplex." Similarly the 60-tooth wheel was used to divide the sector shown in Fig. 1, again indexing one tooth, which gave, of course, an angular movement of $\frac{360}{60} = 6$ deg.

Although it has not been tried out, the arrangement shown might be modified to include an additional bracket to carry a train of wheels and it occurs to the writer that the necessary weight, mentioned by "Duplex" to take up play in the gear train, could be made lighter, since, as already mentioned, the mandrel revolves on dead centres, the lathe spindle remaining stationary.

Utility Steam Engines

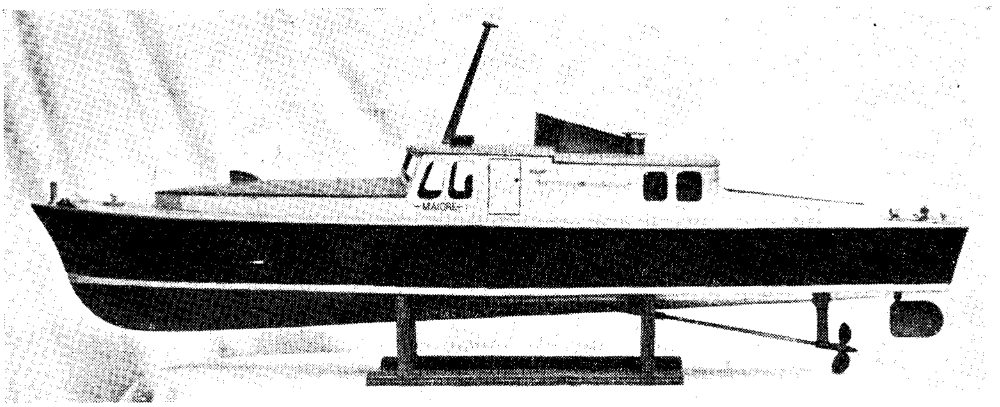
(*Continued from page* 310)

A simple form of pressure reducing-valve is illustrated, which consists of a chamber having a diaphragm which can be adjustably spring-loaded, and movement of the diaphragm controls the entry of steam to the chamber by means of an inverted pin-valve. When no steam is flowing into the chamber, the pressure of the loading spring on the diaphragm forces it inwards, lifting the valve off its seating in the passage which leads into the chamber.

On admitting pressure to the chamber, nothing happens unless and until the pressure exerted on the diaphragm balances the load applied by the spring, when the diaphragm moves outwards and closes the entry-valve. The lower side of the diaphragm being open to atmosphere, it is clear that the balance pressure for any given setting will depend on the difference of pressure on the two sides of the diaphragm, and is practically independent of the supply pressure at the inlet, as this is exerted only on the relatively small area of the valve-head, tending, if anything, to close the entry if steam pressure in the supply line increases; in other words, producing slight over-compensation.

Valves of this type are very extensively used in industrial steam plants, and as all welders know, are a standard fitting in oxy-acetylene apparatus for reducing the extremely high gas cylinder pressure to a conveniently low pressure for operating the blowpipe. The details of construction may vary; in some cases a piston may be used instead of a diaphragm, and it may operate through a ball-valve, piston valve or ported sleeve, but the form shown is best suited for use in a very small size. The diaphragm must be sufficiently flexible to move readily over the small range required; the material generally used in full-size practice is beryllium-copper alloy, which retains its elasticity indefinitely and does not become brittle through fatigue. A serviceable substitute is phosphor-bronze foil or stainless-steel of the type used in dentistry, about 0.010 in. thick. It should be corrugated as shown, by spinning, rolling or pressing, to increase its flexibility and enable it to expand freely.

(*To be continued*)



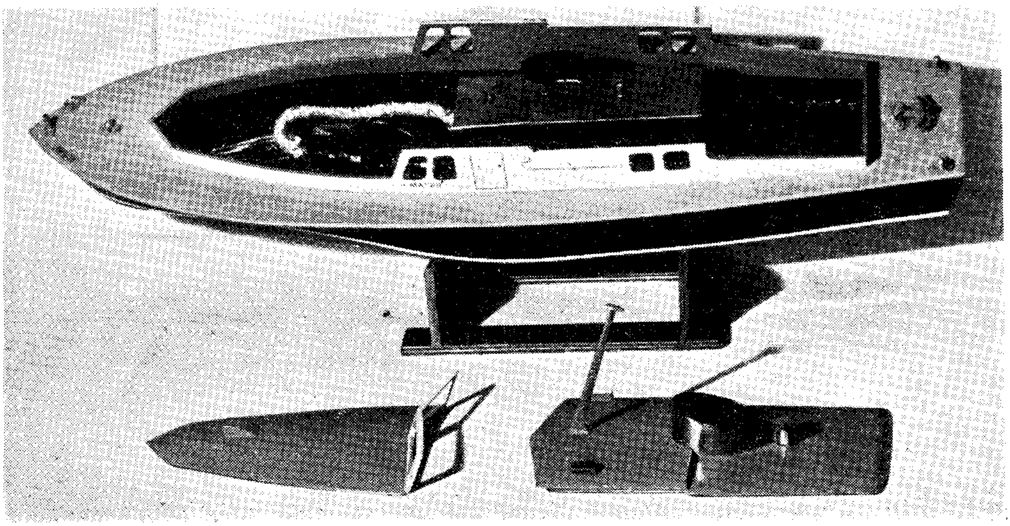
A Model Steam-driven Launch

THE launch *Maigre* is 30 in. long with a beam of 8 in. and a maximum depth of $4\frac{1}{4}$ in. The hull is of the hard chine, hollow-section type, built of pine in two layers, cemented together with synthetic resin.

The power plant consists of a twin-cylinder, single-acting, horizontally-opposed engine, $\frac{7}{16}$ in. bore $\times$ $\frac{5}{8}$ in. stroke, the steam distribution being controlled by a rotary-valve driven by a follower crank. The engine is of fabricated construction, the various components being built-up and silver-soldered together.

Steam is supplied by a boiler $1\frac{3}{4}$ in. diameter $\times$ 6 in. long, fitted with three No. $\frac{3}{16}$ in. diameter water-tubes on the "Averill" principle. The $\frac{1}{16}$ in. thick ends are flanged and silver-soldered in position. The drum is enclosed in a tinned sheet-steel casing bent up in one piece and lined with $\frac{1}{16}$ in. asbestos, extensions of the central stay serving to position and support the drum in the casing. Firing is by a gauze-covered tray-type of spirit lamp and the steam pipe is lead through the flame. The plant drives a two-bladed $1\frac{3}{4}$ in. diameter $\times$ $2\frac{1}{2}$ pitch propeller fitted to a 5/32 in. stainless-steel shaft supported on a built-up skeg.

The hull is finished green underneath, with black topsides, separated by a white "boot topping." The superstructure is white, the deck cream and cabin tops Naples yellow; the funnel, safety-valve vent, rudder and skeg being polished brass.—E. R. ROGERS.



Photos by] [*C. Boyles*

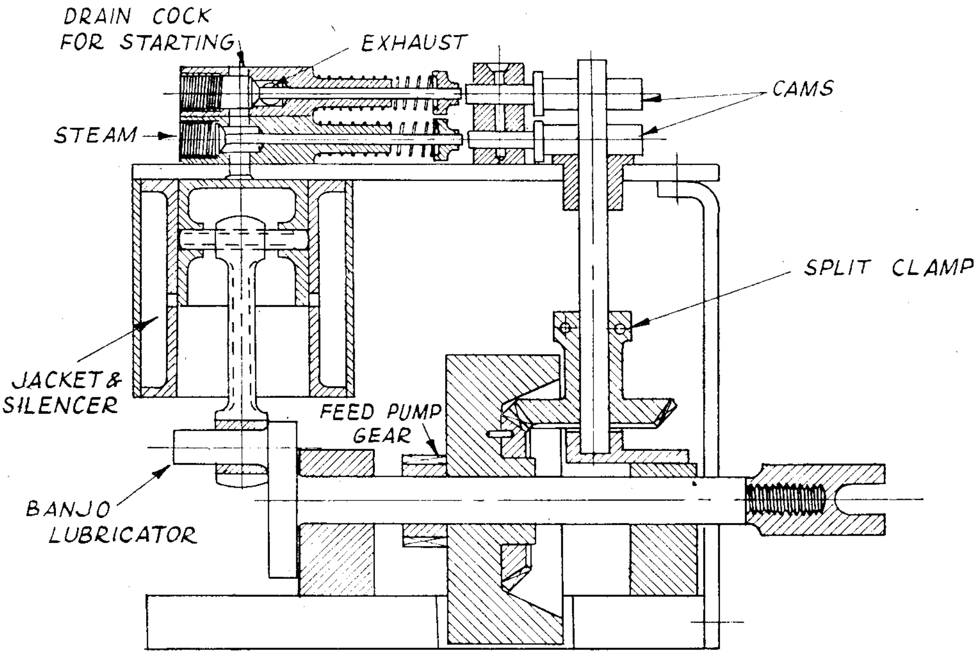
Deck view of the model launch "Maigre," with portable superstructure removed

PRACTICAL LETTERS

Poppet Valve Steam Engines

DEAR SIR,—I have read with interest the recent articles on "Utility Steam Engines" in THE MODEL ENGINEER, and there is a variation of type not specially mentioned, which might be of interest.

The diagram below is of the layout, and you will see that the two poppet-valves are horizontally disposed on the top of the cylinder, which is jacketed to some extent by the exhaust steam. The bore and stroke are 9/16 in., valve heads



5/32 in. seated on $\frac{1}{8}$-in. ports. The springs are about three ounces, and under load, driving boat propeller in tank, the engine runs at 6,500 r.p.m., with forty-five pounds of steam. I think it would run very much faster with double the steam pressure.

There is a boiler feed pump driven by a 4 to 1 gear between the flywheel and the front main bearing. The steam drying coil is in the boiler up-take, and from the up-take to the inlet valve chest there is no exposed steam pipe. Above this coil is another one, which heats the feed water quite successfully ; it becomes too hot to keep the hand in it.

The engine seems to be quite a useful type, and does not give any trouble. It starts easily, and will run quite slowly if required. The intake valve opens a little before centre, and closes about a third of a rev. down the stroke, and the exhaust ports open 45 deg. before bottom centre.

One thing that surprised me about it was that there has been no trouble with the valves sticking, nor with steam leaking from the inlet valve stem. The valves are of stainless-steel, and the seats are cast phosphor-bronze.

Yours faithfully,

Birmingham. CLAUDE GUTHRIE.

Locomotive Test Stands

DEAR SIR,—I have read with interest Mr. Shellshear's description of his locomotive running stand, but while agreeing with, and fully appreciating the three reasons given in the second-paragraph for constructing such a stand, I am quite unable to accept his last sentence in the same paragraph which reads : "In addition, means should be provided for registering the drawbar effort being developed *at any stage of the test run.*" I disagree with this statement because the stand, as described cannot fulfil this requirement.

I am sure Mr. Shellshear will forgive me for pointing out that the last seven words of this statement require qualification ; for, clearly, the only effective drawbar pull that can really be measured during a test run, is the sum of the efforts required to : (*a*) produce angular acceleration of the roller-flywheel system of the stand, and ; (*b*) the effort required to overcome the frictional resistances between the locomotive wheel flanges and rollers, and that of the rollers themselves.

It is agreed that the size of the flywheels, based on the calculations given by Mr. Shellshear, will

enable the particular locomotive to accelerate, or decelerate, in a completely realistic manner; but it will not be possible to measure the drawbar pull capabilities of the engine concerned when its wheels are turning at a constant velocity. To enable this to be done, the addition of a brake acting on one—preferably all—of the flywheels, is all that is necessary.

Concluding, if Mr. Shellshear is ever in London, the Society of Model and Experimental Engineers will, no doubt, be very pleased to show, and explain, the workings of their locomotive test-stand, which is the joint work of many members of the Society, is capable of testing locomotives of all gauges from 2½ in. to 5 in., and has been shown conducting actual tests on locomotives at THE MODEL ENGINEER Exhibition and on other occasions.

Yours faithfully,

Ruislip. G. H. WILDY, A.M.I.Mech.E.

Chemical Silver-plating

DEAR SIR,—I have read, with some interest, the article on the above subject.

Your contributor states: "The silver chloride is dissolved in water; quantities are not critical, but ½ oz. dissolved in 3 oz. or 4 oz. of water gives satisfactory results."

The solubility of silver chloride in cold water is given as 0.00009 grms. in 100 mls. and hence to dissolve ½ oz. would required not "3 oz. or 4 oz." but approximately 3,000 gallons! If silver chloride was soluble in water, it would be impossible to wash it in the manner stated in the article.

I might also point out that 1/20 oz. of silver nitrate would yield only about 1/25 oz. of silver chloride.

Yours faithfully,
RONALD S. HATFULL.

Sutton, Surrey. F.R.I.C., F.C.S.

CLUB ANNOUNCEMENTS

Blackheath Model Power Boat Club

We are holding our annual regatta under M.P.B.A. ruling on Sunday, September 11th, at the Princess of Wales Pond, Blackheath, commencing at 11.15 a.m. All M.P.B.A. affiliated members will be welcomed, and the following events will be run:—

Nomination race, 50 yd. course.
300 yd. race for "C" class hydroplanes.
300 yd. race for "C" class (restricted) hydroplanes.
Steering competition.
300 yd. race for "B" class hydroplanes.
500 yd. race for "A" class hydroplanes.

A special "Mystery Prize" will also be awarded.

In all hydroplane events, competitors will be allowed two runs and two releases per run.

Buses Nos. 108, 75 and 89 pass the pond. Blackheath Station is but a short walk away.

Light refreshments will be available at the pondside and nearby.

Hon. Secretary: A. A. RAYMAN, 59, Murillo Road, Lee, S.E.13. Phone: Lee Green 5401.

Ickenham and District Society of Model Engineers

The above society will meet on alternate Fridays until September 30th, after which they will revert to the usual weekly meetings at Ickenham Hall, Glebe Avenue, Ickenham, at 7.30 p.m. Visitors and new members will be accorded a very warm welcome, as we cover a good deal of branches of model work, and a very interesting and extensive programme for the winter session is being formulated.

Our new workshop will be available shortly, and canteen facilities are always at the service of members and visitors.

Hon. Secretary and Treasurer: H. C. PIGGOTT, "Chatsworth," 23a, Parkfield Road, Ickenham.

Blackpool Society of Model Engineers

Owing to unforeseen difficulties, the public exhibition, which was to have been held in May, had to be abandoned. In its place an exhibition of members' work will be held at the society's headquarters, 46, Adelaide Street, on September 16th, from 7 p.m. to 10 p.m. All interested are cordially invited to attend.

Among recent "outside" activities was a visit to Fleetwood to inspect the Isle of Man Steam Packet Company's latest steamer, the *Snaefell*.

The North Wales Model Engineering Society

This society was formed about six months ago in this district, and so far several meetings have been held at which lectures have been given by members on such subjects as locomotive valve-gears and "OO"-gauge modelling. Tours have been arranged of Crewe Works and various local engineering undertakings. At the moment difficulty is being experienced owing to the pressure of outside work upon members caused by the seasonal nature of the occupations in this locality; but nevertheless it is planned to have an exhibition of members' models in shop windows for one week each at Llandudno and Colwyn Bay. It is also proposed to enter a club model of a steam tug for the next year's MODEL ENGINEER Exhibition. Anyone in this district who is interested is asked to contact the Hon. Secretary, A. P. Parke, Morwenna, Great Orme's Road, Llandudno.

Huddersfield Society of Model Engineers

On Saturday, September 17th we have another open day at Highfield. Several new locomotives should be in action and will add new interest on the track, and, following the recent increase in rainfall, the pond should be in better condition and increased aquatic activity result.

On Honley Feast Monday, September 26th, a visit to the British Railways Sheds and Works at Crewe is arranged This date, whilst obviously not suitable for all members is about the only opportunity to visit the works while in action, and it is thought that sufficient members will be on holiday on that day to make up a good party.

In the more distant future, November 5th, Plot Night at Highfield. November 7th to 12th there is to be a Hobbies Exhibition in the Drill Hall under the auspices of the Rotary Club and we are to have a small representative stand of models, some in action under compressed air, and also run a railway.

Reverting to past events, the trip in July to Park Gate iron and steel works was voted one of the most interesting we have had and thanks are due to member Jack Schofield who suggested the visit and did a bit of preliminary sounding at Park Gate.

Hon. Secretary: F. W. L. Bottomley, 763, Manchester Road, Huddersfield.

Derby Model Racing Club

We are holding the Derby Class "C" and Class "C" restricted hydroplane open events at Allestree Park, on Sunday, September 18th, 1949, and we shall be glad to receive entries as early as possible.

Practising starts at 11 a.m. and racing begins at 2.30 p.m. In addition to the open events, several club races will be staged, and weather permitting, we hope for a good day's sport.

Tea and light refreshments may be had in the park after 3 p.m.

Hon. Secretary: IAN W. MOORE, 2, Bridge Street, Derby.

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